Main

Depository
RECEIVED
APR 28 1978
O.S.U. LIBRARIES

SELECTED WATER RESOURCES ABSTRACTS

UNIVERSITY
MAY
LIBRARY

VOLUME 11, NUMBER 8
APRIL 15, 1978

TC1
S45
No 8

W78-03201 -- W78-03700
CODEN: SWRABW

SELECTED WATER RESOURCES ABSTRACTS is produced by the Office of Water Research and Technology, U.S. Department of the Interior, and published twice monthly by the National Technical Information Service (NTIS), U.S. Department of Commerce, for the Water Resources Scientific Information Center (WRSIC).

SELECTED WATER RESOURCES ABSTRACTS (SWRA) is available to Federal agencies and their contractors or grantees in water resources research upon request, citing contract or grant number and sponsoring agency. Write: Manager, Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior, Washington, DC 20240.

Some documents abstracted in this journal can be purchased from NTIS. Price codes are given in the entries and a current code-price conversion table is attached to the outside back cover. Other documents are available from originating organizations or authors as indicated in the citation.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from NTIS, 5285 Port Royal Road, Springfield, VA 22161. Annual subscription rates for the North American Continent are: SWRA Journal only, $75; Journal and Annual Indexes, $100; Indexes only, $50. Other addressees, write for prices.

SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 8
APRIL 15, 1978

W78-03201 -- W78-03700

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

CONTENTS

FOREWORD iii

SUBJECT FIELDS AND GROUPS

Please use the edge index on the back cover to locate Subject Fields and Indexes.

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Nonwater Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

ON THE SMOOTHING OF OSCILLATIONS IN FINITE-PERIOD UNIT HYDROGRAPHS DERIVED BY THE HARMONIC METHOD,
Imperial Coll. of Science and Technology, London (England).
For primary bibliographic entry see Field 2E.
W78-03243

CAMBRIAN STRATIGRAPHIC NOMENCLATURE AND GROUND-WATER PROSPECTING FAILURES ON THE HUALAPAI PLATEAU, ARIZONA,
Wyoming Univ., Laramie. Dept. of Geology; and Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2F.
W78-03445

2B. Precipitation

DEUTERIUM IN HAILSTONES COLLECTED ON 29 NOVEMBER 1972,
National Physical Research Lab., Pretoria (South Africa).
D. v. d. S. Roos, H. Schooling, and J. C. Vogel.
Quarterly Journal of the Royal Meteorological Society, Vol. 103, No. 438, p 751-767, October 1977. 8 fig, 3 tab, 19 ref.

Descriptors: *Hail, *Africa, *Deuterium, *Cloud physics, Hailstorms, Storms, Weather, Tracers, Heavy water, Isotope studies, Data processing, Analytical techniques, Meteorology, *Deuterium, *Hailstones, *South Africa.

The deuterium content of more than 400 samples cut from 34 hailstones was determined. These hailstones came from three storms, the structures of which were studied by radar. The range in values of deuterium excess (dD) of about 60 parts per thousand (extending as low as -86 parts per thousand) was compatible with the moist adiabatic model only if a significant increase in dD of atmospheric vapor occurred at some stage. Individual growth layers were concluded isotopically uniform. Opaque ice was associated with relatively low dD, especially for the bulk of the hailstones beyond the embryo stage. The correlation found between dD and crystal size was used to derive the relationship between dD and ambient temperature. Hence, it was concluded that embryos mostly grew between 6 and 7 km above ground level. Hailstones of all sizes acquired most of their mass between 7 and 8 km (-20 to -25C) during the early stages of the severe storms when radar echo tops reached up to 16 km. However, during later stages most of the growth occurred during descent. Hailstones from places no more than a few kilometers apart in one storm were concluded to have grown in very different conditions; while some hailstones must have experienced updraughts in which the speed in the environment of the hailstones increased steadily with time and others encountered an updraught that pulsated with a period of about 8 min. Updraught maxima often occurred at about 7.5 km, approaching values of 40 m/s. (Sims-ISWS)
W78-03246

THE EFFECT OF IRRIGATION ON PRECIPITATION IN THE GREAT PLAINS,
Illinois State Water Survey, Urbana.
P. T. Schickedanz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 921, Price codes: A06 in paper copy, A01 in microfiche. Report No. NSF/RA-760460, November 1976. 111 p, 29 fig, 9 tab, 30 ref. NSF GI-43871.

Descriptors: *Irrigation, *Precipitation(Atmospheric), *Irrigation effects, *Kansas, *Nebraska, *Texas, *Great Plains, Rainfall, Weather, Effects, Irrigated land, Climates, Water utilization, Weather modification, Data processing, Analytical techniques, Meteorology, Climatology, Climatic changes.

This research addressed the question of whether the extensive irrigation in the Great Plains has had an appreciable effect on the climate of the region. The primary objectives of the research were to examine for a rainfall anomaly due to irrigation and to measure the magnitude of the effect. Another objective was to investigate other associated weather variables for supportive relationships which also could be used to help explain the physical causes. The basic study region included the states of Kansas, Nebraska, and a large portion of the state of Texas. In addition, some data rom the states of Colorado, New Mexico, Wyoming, Iowa, Missouri, and South Dakota were used for extra-area control purposes. The analysis of rainfall trend maps, the factor analysis, the analysis of convariance, and the ratio comparison patterns produced strong evidence for irrigation effects in Nebraska during June, in Texas and Kansas during July, in Kansas during August, and in all three states during summer, (Sims-ISWS)
W78-03486

2C. Snow, Ice, and Frost

SNOW ACCUMULATION AND MELT IN SPRAYED AND UNDISTURBED BIG SAGEBRUSH VEGETATION,
Rocky Mountain Forest and Range Experimentation Station, Collins, CO.
For primary bibliographic entry see Field 4C.
W78-03320

THERMAL REGIME OF PRAIRIE SNOWCOVER,
Saskatchewan Univ., Saskatoon. Div. of Hydrology.
R. J. Granger, D. S. Chanasyk, D. H. Male, and D. I. Norum.
Soil Science Society of America Journal, Vol. 41, No. 5, p 839-842, September-October 1977. 6 fig, 1 tab, 8 ref.

Descriptors: *Snowpacks, *Snow cover, *Melting, *Energy budget, On-site investigations, Instrumentation, Winds, Temperature, Humidity, Soil temperature, Air temperature, Solar radiation, Heat transfer, Energy transfer, Data processing, Analytical techniques, Snow, Infiltration, *Prairie snowcover, *Thermal regime.

An energy budget approach was used to study the melting of a shallow prairie snowpack. In the analysis, all the terms of the energy for the melt was the net radiation flux. Over a continuous snowcover, the contribution of sensible heat to the melt could not be represented by a simple low-level temperature index but was dependent on the energy content of the air mass. The latent heat flux responded to the radiation flux, with daytime evaporation and nighttime condensation; however, the net daily flux was evaporative. Nighttime refreezing of the snowpack limited the runoff, with approximately 40% of the daily meltwater being retained or refrozen in the snowpack. Beneath the melting snowcover, the diurnal cycle of soil heat flux was almost completely eliminated. Monitoring of soil moisture changes during the melt period showed that very little infiltration occurred until the soil had thawed. (Sims-ISWS)
W78-03460

WINTER SNOW-COVER MAPS OF NORTH AMERICA AND EURASIA FROM SATELLITE RECORDS, 1966-1976,
National Environmental Satellite Service, Washington, DC.
For primary bibliographic entry see Field 7C.
W78-03482

2D. Evaporation and Transpiration

MODELING OF OIL EVAPORATION IN AQUEOUS ENVIRONMENT,
Technische Univ., Brunswick (West Germany). Leichtweiss Inst. for Water Research.
W. C. Yang, and H. Wang.
Water Research, Vol. 11, No. 10, p 879-887, 1977. 14 fig, 3 tab, 10 ref.

Descriptors: *Oil, *Evaporation, *Weathering, *Model studies, Mathematical models, Numerical analysis, Thin films, Laboratory tests, Aquatic environment, Interfaces, Hydraulic models, Oil-water interfaces, Boundary processes, Wind velocity, Oil evaporation, Oil-air interfaces.

A numerical model was developed to predict the changes of oil characteristics, specific gravity, percentage weight remain, and percentage volume remain of oil on water through evaporation known to dominate the early stage of weathering. The model was based on the assumption that oil, though complex, can be considered as a chemical compound of individual fractions of distinguishable chemical and physical characteristics. The major driving forces for evaporation considered included air temperature, wind speed, and size of slick. Laboratory experiments were conducted using No. 2 fuel oil, Migerian Crude, and Venezuelan Crude to calibrate the numerical model and to gain physical insight of theoil evaporation process. Based on the laboratory results, empirical relationships were proposed for determining the diffusion coefficient described in the first-order decay formula. Laboratory results revealed that the first-order decay law of a unique diffusion coefficient cannot adequately cover the total range of decay. Both numerical and laboratory results seemed to indicate that the effect of temperature on oil weathering is significant in the very early stage of weathering, but diminishes at a later time. The effect of wind speed is more uniform throughout the time duration being tested. (Humphreys-ISWS)
W78-03244

TEST OF A SOIL WATER MODEL UNDER FIELD CONDITIONS,
Goettingen Univ. (West Germany). Inst. Soil Science and Forest Nutrition.
For primary bibliographic entry see Field 2G.
W78-03251

EVAPOTRANSPIRATION FROM A SATSUMA MANDARIN ORCHARD DETERMINED BY ENERGY BALANCE METHOD, (IN JAPANESE),
Ministry of Agriculture and Forestry, Hiroshima (Japan). Fruit Tree Research Station.
Y. Machida, Y. Hase, T. Maotani, K. Yamatsu, and T. Yamasaki.
Bull Fruit Tree Res Stn (Minist Agric For) Ser E (Akitsu) 1, p 37-50, 1976.

Descriptors: *Evapotranspiration, Orchards, *Energy balance method(Plants), Citrus crops, *Measurement, Plant evapotranspiration, Albedo, *Citrus-unshiu, Leaf, Solar radiation, Temperature.

Determination of evapotranspiration from a satsuma mandarin (Citrus unshiu Marc.) orchard was made in 1973-1974 by the energy balance method. Twelve-year old trees were planted at 2.6 x 2.6 m

spacing. Net radiation and short-wave reflection were measured at the height of 4 m, solar radiation at 1 m, and wet- and dry-bulb temperatures at 0.3 and 2 m above the canopy surface. Albedo and the ratio of effective long-wave radiation to short-wave radiation (F/(Q + q)) remained fairly constant during July-Sept. In Oct., however, they increased simultaneously and the resultant decrease in the ratio of net radiation to solar radiation (S/(Q + q)) occurred. Average daily evapotranspiration in Aug., Sept., Oct., and Nov. were 3.94, 2.61, 1.72 and 1.44 mm, respectively, in 1973, and those in July and Aug. were 3.55 and 4.03 mm in 1974. Average of the ratio of actual evapotranspiration to Penmans potential evapotranspiration (E/Eo) were 0.83, 0.82, 0.91 and 0.97 in Aug., Sept., Oct., and Nov., respectively, in 1973, and 0.87 and 0.76 in July and Aug. in 1974. The ratio E/Eo increased with increase of the soil water due to rainfall or irrigation and decreased gradually with time. The regression line of latent heat flux on net radiation during the daytime was determined; latent heat flux on solar radiation was also determined. Leaf water potentials were determined with a pressure chamber before irrigation in each year.--Copyright 1978, Biological Abstracts, Inc.
W78-03262

THERMAL REGIME OF PRAIRIE SNOWCOVER,
Saskatchewan Univ., Saskatoon. Div. of Hydrology.
For primary bibliographic entry see Field 2C.
W78-03460

2E. Streamflow and Runoff

ROUTING OF FLOODS IN RIVER CHANNELS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
M. A. Gill.
Nordic Hydrology, Vol. 8, No. 3, p 163-170, 1977. 3 fig, 3 ref.

Descriptors: *Flood routing, *Streamflow, *Storage, *Optimization, Graphical analysis, Equations, Streamflow forecasting, Routing, Channel flow, Approximation method, Mathematical studies, Least squares method, Regression analysis, Parametric hydrology, Muskingum method, Data analysis.

An objective method of determining the constants of the Muskingum type linear equation was described. In situations where the relationship between storage and the weighted flow is non-linear, an approximate method of analysis was proposed. The methods were explained by solving typical examples. (Visocky-ISWS)
W78-03240

FEASIBILITY OF ELECTROMAGNETIC STREAMFLOW MEASUREMENTS USING THE EARTH'S FIELD,
Petro Canada Engineering Ltd., Calgary (Alberta). Dept. of Transportations and Operations.
H. Ryckborst, and R. O. Christie.
Hydrological Sciences Bulletin, Vol. 22, No. 2, p 241-255, 1977. 11 fig, 12 ref.

Descriptors: *Streamflow, *Measurement, *Instrumentation, *Canada, Velocity, Analog models, Electromagnetic waves, Magnetic studies, Data collections, Equations, Numerical analysis, Electrical studies, *Fraser River(British Columbia), *British Columbia, Electromagnetic induction, Earth's magnetic field.

Experimental work on electromagnetic streamflow measurements on the tidal Fraser River in British Columbia showed that the method of using the earth's magnetic field has two advantages: it gives an instantaneous value of the water velocity integrated over the entire cross section of the river, and it is independent of temperature. In the Canadian climate both factors are important. The instrumentation is relatively inexpensive, and it consists of a digital to analog converter, strip chart recorder, cable, and silver electrodes. The instrumentation is essential for noise filtering and signal amplification. However, the final interpretation of the measured signal is quite difficult; it requires measurements from an electronic analog of the river cross set section, resistivity of the ground below, conductivity of the water, and a numerical hydrodynamic model. The flow velocities obtained from the measurements of induced potentials, caused by the Fraser River flowing across the earth's magnetic field, compared favorably with velocities computed from a proven hydrodynamic numerical model. (Visocky-ISWS)
W78-03242

ON THE SMOOTHING OF OSCILLATIONS IN FINITE-PERIOD UNIT HYDROGRAPHS DERIVED BY THE HARMONIC METHOD,
Imperial Coll. of Science and Technology, London (England).
M. J. Hall.
Hydrological Sciences Bulletin, Vol. 22, No. 2, p 313-324, June 1977. 4 fig, 11 ref.

Descriptors: *Unit hydrographs, *Fourier analysis, *Frequency, Hydrograph analysis, Hydrographs, Hydrology, Equations, Mathematical studies, Foreign research, Rainfall, Runoff, Algorithms, *Harmonic method, Finite-period unit hydrographs, Instantaneous unit hydrograph.

The application of many of the well-known methods of inversion to rainfall excess and direct runoff data often produces finite-period unit hydrographs whose ordinates are distorted by high frequency oscillations. A simple extension of the basic algorithm for the harmonic method of deriving the finite-period unit hydrograph provided a means of smoothing such oscillations. The modified method has computational advantages over the use of moving average smoothing schemes applied to the derived unit hydrograph. (Lee-ISWS)
W78-03243

FINITE ELEMENT SIMULATION OF OVERLAND AND CHANNEL FLOW,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
B. B. Ross, D. N. Contractor, and V. O. Shanholtz.
Transactions of the American Society of Agricultural Engineers, Vol 20, No 4, p 705-712, July-August 1977. 6 fig, 3 tab, 32 ref. OWRT A-062-VA(4).

Descriptors: *Watersheds(Basins), *Overland flow, *Channel flow, *Model studies, *Finite element analysis, Analytical techniques, Hydrograph analysis, Land use, Analysis, Mathematical models, Mathematical studies, Flood routing, Flood flow, Runoff, Numerical analysis, Discharge(Water), Hydrographs, Hydrology, Rainfall-runoff relationships, *Simulation analysis.

A finite element approach to problem of flood routing, in which Galerkin's method was used to solve the kinematic equations of one-dimensional transient flow in open channels, was presented. A computer model was developed to predict runoff hydrographs given the required input parameters. The method of predicting precipitation excess appeared to give good estimates for the cases considered. The discretization feature of the model allowed sudden, isolated land use changes to be made, along with gradual land use changes which occur over an entire watershed. Also, the effect of the land use changes on the downstream flows could be determined. The effects of population increase and flood detention structures in the watershed were predicted. Comparisons were made between the present downstream hydrograph and the future downstream hydrograph with land use changes. Increases in the downstream peak flows, due to the changes, were relatively small but can be expected to become more apparent as the model is applied to less developed watersheds and storm events of lesser magnitude. (Humphreys-ISWS)
W78-03449

FAUNA AND DENSITIES OF MOLLUSCS IN SOME MOUNTAIN WATERS IN THE SURROUNDINGS OF DOMBAS (SOUTH NORWAY), (IN GERMAN),
Gesamthochschule Duisburg (West Germany).
For primary bibliographic entry see Field 5B.
W78-03669

2F. Groundwater

WATER INFILTRATION AND RUNOFF UNDER RAIN APPLICATIONS,
Utah State Univ., Logan. Dept. of Agriculture and Irrigation Engineering.
For primary bibliographic entry see Field 2G.
W78-03249

CAMBRIAN STRATIGRAPHIC NOMENCLATURE AND GROUND-WATER PROSPECTING FAILURES ON THE HUALAPAI PLATEAU, ARIZONA,
Wyoming Univ., Laramie. Dept. of Geology; and Wyoming Univ., Laramie. Water Resources Research Inst.
P. W. Huntoon.
Ground Water, Vol 15, No 6, p 426-433, November-December 1977. 3 fig, 1 tab, 13 ref. OWRT B-031-WYO(2), 14-34-0001-6134.

Descriptors: *Aquifers, *Arizona, *Groundwater availability, *Groundwater resources, Stratigraphy, Springs, Base flow, Permeability, Groundwater recharge, Test wells, Water yield, Geologic formations, Drilling, Tertiary period, Paleozoic era, Structural geology, limestones, Dolomite, *Grand Canyon, *Hualapai plateau.

The best potential aquifers underlying the 600 sq mi Hualapai Plateau of northwestern Arizona are: (1) the Cambrian Rampart Cave Member of the Muav Limestone, and (2) interbedded Tertiary sedimentary and volcanic rocks that locally fill old canyons on the plateau. The target aquifers were identified on the basis of spring locations on the flanks of the plateau, primarily along the walls of the Grand Canyon to the north and east. Total groundwater discharge from springs along the plateau is approximately 4 cu ft/sec. To date, the largest production from a test well on the plateau is 120 gal/min from Tertiary rocks. The Cambrian rocks have frustrated development in part because of small permeabilities, small recharge (0.1 in/yr minimum), and the fact that the rocks are well drained. The complex stratigraphic nomenclature used to describe the Cambrian rocks in the region has contributed inadvertently to prospecting failures. The Cambrian section is characterized by thick interbedded limestones and shales, with the basal limestone being the principal target aquifer. These relationships have not been conveyed adequately to managers and drillers, with the result that critical test holes have been terminated in shales that overlie the target aquifer. Dry holes have been the result. (Visocky-ISWS)
W78-03445

THE IONIC COMPOSITION OF LAKES FED BY GROUND WATER AND PRECIPITATION IN THE UPPER ROMERIKE DISTRICT,
Oslo Univ. (Norway). Dept. of Limnology.
For primary bibliographic entry see Field 2H.
W78-03471

WATER TABLE MAPPING USER'S MANUAL,
Nevada Univ., Reno. Desert Research Inst.

For primary bibliographic entry see Field 7C.
W78-03484

2G. Water In Soils

DEVELOPMENT OF A SOIL-WASTE INTERACTION MATRIX FOR ASSESSING LAND DISPOSAL OF INDUSTRIAL WASTES,
Chemical Engineering Research Consultants Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5E.
W78-03222

WATER INFILTRATION AND RUNOFF UNDER RAIN APPLICATIONS,
Utah State Univ., Logan. Dept. of Agriculture and Irrigation Engineering.
A. Y. Hachum, and J. F. Alfaro.
Soil Science Society of America Journal, Vol. 41, No. 5, p 960-966, September-October 1977. 9 fig, 4 tab, 13 ref.

Descriptors: *Infiltration, *Runoff, *Model studies, *Laboratory tests, Simulated rainfall, Mathematical models, Ponding, Pressure head, Wetting, Irrigation, Sprinkler irrigation, Rainfall, Soils, Soil water, Saturation, Soil science.

Experiments to verify the validity and to evaluate the performance of rain infiltration models based on extending the Green and Ampt approach are lacking in the literature. There are severe gaps between theory, validity, and practicality of these models. In this study, a physically based model for describing infiltration into a homogeneous deep stable soil profile with uniform initial water content distribution was presented. The derivation of the model was based on the concept of mapping the actual wetted soil zone into an equivalent rectangular saturated zone with constant effective hydraulic conductivity and capillary pressure head at the abrupt wetting front. The model took into account the initial water mobility in the soil profile and predicted the system response under any rainfall pattern. The proposed model was further simplified, for practical purposes, by grouping 3 basic input parameters into a single parameter, the Surface Saturation Index. The validity of the model was tested and was supported strongly by the results of laboratory experiments conducted on samples of 3 soils, 2 silt loams and a silty clay loam, under 5 different (variable and constant) water application rate patterns. It was found that the amount of runoff from a nearly symmetrical convex variable rainfall pattern was very close to that which resulted from its equivalent average constant application rate pattern, regardless of the significant differences between the times at which runoff begins and the characteristics of infiltration rates thereafter. (Sims-ISWS)
W78-03249

RATES AND PATTERNS OF WATER UPTAKE IN A DOUGLAS-FIR FOREST,
British Columbia Univ., Vancouver. Dept. of Soil Science.
J. U. Nnyamah, and T. A. Black.
Soil Science Society of America Journal, Vol. 41, No. 5, p 972-979, September-October 1977. 14 fig, 3 tab, 24 ref.

Descriptors: *Moisture uptake, *Forests, *Soil water movement, On-site investigations, Instrumentation, Tensiometers, Hydrometers, Trees, Douglas fir trees, Water balance, Hydraulic conductivity, Soils, Soil water, Root zone, Drying, Evapotranspiration, Soil science, Forestry, Root density, Forest water balance.

The forest water balance was studied in a thinned (840 stems/ha) and an unthinned (1,840 stems/ha) Douglas-fir forest during two consecutive summers. Soil water content was measured with the neutron meter. Soil water potential was measured with tensiometers and dew point hygrometers over a range of 0 to -15 bars. The data were used to compute water extraction rates and patterns for the root zone over a four-week drying period. The results showed a gradual downward shift of the zone of maximum root water uptake as the soil dried. The fully developed root system of Douglas fir showed less hydrotropic response than the developing root systems of annuals reported in the literature. There was good correlation between water uptake rate and rooting density. During the drying period, water flux into the bottom of the root zone, estimated by the use of Darcy's law, increased from 8 to 15% of the evapotranspiration at the thinned site and from 2 to 8% at the unthinned site. Soil profile water depletion corrected for flux out of or into the bottom of the root zone agreed well with evapotranspiration computed from micrometeorological energy balance data. Water withdrawal from trunk storage accounted for only 2% of the total evapotranspiration over the four-week drying period. (Sims-ISWS)
W78-03250

TEST OF A SOIL WATER MODEL UNDER FIELD CONDITIONS,
Goettingen Univ. (West Germany). Inst. Soil Science and Forest Nutrition.
F. Beese, R. R. Van der Ploeg, and W. Richter.
Soil Science Society of America Journal, Vol. 41, No. 5, p 979-984, September-October 1977. 4 fig, 2 tab, 27 ref.

Descriptors: *Soil water, *Unsaturated flow, *Evaporation, On-site investigations, Model studies, *Mathematical models, Lysimeters, Moisture content, Soil water movement, Soils, Soil properties, Precipitation(Atmospheric), Rainfall, Drainage, Subsurface drainage, Agriculture.

A 218-day experiment on a fallow loess soil was carried out to study infiltration and redistribution under natural field conditions. On an experimental plot of 6 by 6 m, tensiometers were installed at 11 depths: 10, 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 cm. The tensiometers were read at short irregular intervals. The precipitation was measured daily. The hydraulic functions of the layered, horizontal soil and a relation between potential evaporation, actual evaporation, and the soil suction at 5-cm depth had been established previously. With use of these soil and atmospheric data, the unsaturated soil moisture flow equation was solved numerically. The purpose of the numerical analysis was to determine if the unsaturated soil moisture flow equation does describe observed soil moisture behavior for such a long period. It was found that the calculated soil suction values for all depths deviated less than 15% from the measured ones. It was concluded that the unsaturated moisture flow equation can be a useful means to supplement field measurements on infiltration, redistribution, evaporation, and internal drainage. (Sims-ISWS)
W78-03251

RETENTION OF SOIL WATER FOLLOWING FOREST CUTTING,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
J. G. McColl.
Soil Science Society of America Journal, Vol. 41, No. 5, p 984-988, September-October 1977. 6 fig, 2 tab, 20 ref.

Descriptors: *Forests, *Soil water, *Clear-cutting, *California, Evaporation, Evapotranspiration, Trees, Moisture content, Drying, On-site investigations, Instrumentation, Tensiometers, Nuclear meters, Forestry, Hydrology, *Eucalyptus trees.

Eucalyptus globulus forests in the Oakland-Berkeley hills, California, were clearcut in 1973-74 following severe damage from freezing in December 1972. The soil water regimes in clearcut and adjoining uncut areas were compared during the two years following cutting. During the wet winter season (December-May), surface drying and evapotranspiration by annual grasses were the only losses in the clearcut; more soil water was retained in the clearcut due to lack of evapotranspiration by the forest trees. Soil water rapidly decreased in both the clearcut and forest during the long, dry summer periods; and differences between the two areas widened. By midsummer, soil matric suctions in the clearcut dropped below 15 bars (22.4% P sub v, volumetric water content), and in the forest to below 70 bars (8.5% P sub v). During the summer, P sub v increased with profile depth in the clearcut; but in the forest, soil water was depleted uniformly with depth in the profile. Although volumetric water contents of soil (P sub v) were significantly different between clearcut and forest areas, rates of water loss (k) during summer were not clearly related to forest cover. In the clay-loam soil, k was dependent on the soil water storage at the beginning of the dry summer period, on the ability of trees in the uncut forest to withdraw water from parent material and from fractured bedrock in excess of that available in the soil profile, and on P sub v which decreased during summer. (Sims-ISWS)
W78-03252

A QUICK METHOD FOR ESTIMATING SOIL WATER DIFFUSIVITY FUNCTIONS,
Cornell Univ. Agricultural Experiment Station, Ithaca, NY. Dept. of Agronomy.
R. D. Miller, and E. Bresler.
Soil Science Society of America Journal, Vol. 41, No. 5, p 1020-1022, September-October, 1977. 1 fig, 4 ref.

Descriptors: *Diffusivity, *Soil water movement, *Infiltration, Model studies, Mathematical models, Equations, Regression analysis, Analytical techniques, Soils, Soil properties, Soil water, Physical properties, Laboratory tests, Soil science, Wetting fronts, Horizontal infiltration.

Published data for horizontal infiltration into air dry nonsodic stable soil imply excellent correlation between soil water diffusivity functions and the rate of advance of the visual wetting front in one dimensional horizontal infiltration experiments. When suitably transformed, data for each of eight soils, ranging from a clay loam to a sieved sand fraction, were represented remarkably well by a single regression equation involving dimensionless variables. This suggests that the same coefficients should apply to similar data for almost any soil. It was shown that the data also can be expressed for a somewhat simpler regression equation, involving only the simplest of experimentally measured quantities so that the diffusivity function can be quickly estimated for any soil. (Sims-ISWS)
W78-03253

ALTERATION OF ENVIRONMENTAL CONDITIONS IN CLEARED NARROW STRIPS IN SPRUCE FORESTS OF THE TIEN-SHAN, (IN RUSSIAN),
Akademiya Nauk Kirgizskoi SSR, Frunze. Inst. Biologii.
For primary bibliographic entry see Field 4C.
W78-03301

WATER CAPACITY OF MOUNTAIN-FOREST AND MEADOW SOILS OF THE NORTHERN CAUCASUS, (IN RUSSIAN),
A. P. Kazankin.
Pachvovedenie 12, p 91-96, 1976.

Descriptors: Trees, *Meadow soils, *Soil-water-plant relationships, *Field water capacity(Soils), Aspen, Beech, Fir, Hornbeam, Pine, Spruce.

Field capacity was determined on slopes with up to 48 degrees and on plain areas. Water in the

amount of 20-25 m3 was pumped. Fir and fir-spruce stands correspond to 146-214 mm field capacity; pure spruce stands to 115 mm field capacity, and thin pine and aspen seedlings to 104 mm. The increase of water capacity to 303 mm is observed under beech-fir plantations. Field capacity of soils under oak and hornbeam forests (218-226 mm) occupies an intermediate position between the zones of dark coniferous and beech forests. The knowledge of the relationship between water capacity and forest forming species is of great practical importance.--Copyright 1978, Biological Abstracts, Inc.
W78-03345

MERCURY DISTRIBUTION IN SOIL AROUND A LARGE COAL-FIRED POWER PLANT,
Environmental Monitoring and Support Lab., Las Vegas, NV. Monitoring Systems Research and Development Div.
For primary bibliographic entry see Field 5B.
W78-03418

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON NITROGEN TRANSPORMATIONS IN SOIL,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 5E.
W78-03424

THE DEPENDENCE OF DEGREE VARIATION OF SOIL MOISTURE ON ITS VALUE, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Science.
N. S. Oreshkina.
Vestn Mosk Univ Ser Vi Biol Pochvoved 31(5), p 49-52, 1976.

Descriptors: *Soil moisture, *Moisture content, Soil analysis, *Alfalfa, *Birch forests.

The value of soil-moisture content under (alfalfa, fallow and birch forests) correlated very lowly with its degree of variation. A number of replications of moisture determinations are necessary to know the pattern of soil desiccation or moisture. --Copyright 1978, Biological Abstracts, Inc.
W78-03451

THERMAL REGIME OF PRAIRIE SNOWCOVER,
Saskatchewan Univ., Saskatoon. Div. of Hydrology.
For primary bibliographic entry see Field 2C.
W78-03460

ERODIBILITY OF SELECTED CLAY SUBSOILS IN RELATION TO PHYSICAL AND CHEMICAL PROPERTIES,
Agricultural Research Service, Oxford, MS. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W78-03461

A LABORATORY TECHNIQUE FOR APPRAISING IN SITU SALINITY OF SOIL,
Montana State Univ., Bozeman. Dept. of Chemistry.
A. Mubarak, and R. A. Olsen.
Soil Science Society of America Journal, Vol. 41, No. 5, p 1018-1020, September-October 1977. 2 fig, 2 tab, 14 ref.

Descriptors: *Saline soils, *Salinity, *Electrical conductance, *Laboratory tests, Centrifugation, Chemistry, Salts, Analytical techniques, Soils, Soil properties, Immiscibility, Soil science, Immiscible displacement, Soil solutions, Dilution effects.

A laboratory technique was devised for removal of solution from soils at field water content. A soil sample can be placed directly in a closable centrifuge tube, thereby minimizing changes which could be induced by altering gaseous equilibria. Water need not be added to the soil sample, so changes in electrical conductivity (EC) and in concentration of species present are avoided. The soil solution was obtained from the sample by immiscible displacement with carbon tetrachloride using centrifugation. The technique is simple and relatively rapid. Values for EC in successively displaced solution samples from a given soil sample were found to be essentially constant. The values for EC obtained for an assortment of soils were significantly higher than those obtained using 2:1 or saturation extracts but were well correlated with them. (SimISWS)
W78-03462

VEGETATION ESTABLISHMENT AND SHORELINE STABILIZATION: GALVESTON BAY, TEXAS,
Texas A and M Univ., College Station. Dept. of Range Science.
For primary bibliographic entry see Field 2L.
W78-03475

EQUILIBRIUM OPERATION OF SUBSURFACE ABSORPTION SYSTEMS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W78-03507

SOIL'S NATURAL PROCESSES CAN CLEAN WASTES FROM SEWAGE WATER.
For primary bibliographic entry see Field 5D.
W78-03558

POLYCYCLIC AROMATIC HYDROCARBONS IN AGRICULTURAL SOIL (POLYZYKLISCHE, AROMATISCHE KOHLENWASSERSTOFFE IN LANDWIRTSCHAFTLICH GENUTZTEN BODEN),
Mainz Univ. (West Germany). Hygiene Inst.
For primary bibliographic entry see Field 5B.
W78-03566

HEAVY METALS TRANSPORT MODEL IN A SLUDGE-TREATED SOIL,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5B.
W78-03590

METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., Stamford, CT. (Assignee).
G. Stepien, Jr., F. L. Califano, and T. E. Russell.
U.S. Patent No. 4,041,712, 9 p, 5 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 961, No 3, p 1019, August 16, 1977.

Descriptors: *Patents, *Soil treatment, *Soil sealants, *Soil moisture, Soil-water-plant relationship, Water conservation, Water loss, Seepage.

The primary purpose of this invention is to provide a method and composition whereby agricultural soils can be treated so as to form a semipervious barrier at a selected depth below the surface, so that the surface soil remains loose and of the proper consistency for nurturing the roots of various plants. The sub-surface barrier must be semipervious because it is necessary that the surface soil drain, in order not to rot the roots of the growing plants. The sub-surface barrier created by the composition and methods of this invention permit either natural moisture or moisture from irrigation to be retained in the top strata of the soil for longer periods of time. The waste of artificial nutrients and fertilizers is also reduced. The composition comprises an aqueous emulsion of asphalt including a cationic emulsifier, a non-ionic surface active agent and elastomer solids. The compositions are particularly adapted for application to agricultural soils. After application to the ground surface, the surface is flooded with water to force the aqueous emulsion downward into the subsurface. A semipermeable fluid barrier is created several inches below the surface. (Sinha-OEIS)
W78-03615

WASTEWATER TREATMENT THROUGH SOIL -- WITH SPECIAL REFERENCE TO SEPTIC TANK EFFLUENT TREATMENT,
ADI Ltd., Fredericton (New Brunswick).
For primary bibliographic entry see Field 5E.
W78-03620

CONTENT OF HYDRATED WATER IN SOILS FROM AN ENERGETIC POINT OF VIEW, (IN RUSSIAN),
Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Inst. of Soil Science and Agrochemistry.
V. R. Volobuev.
Izv Akad Nauk SSSR Ser Biol. 3, p 444-447, 1974.

Descriptors: *Soil water movement, *Minerals(Soils), Energy, Silica, *Soil mass, Energetics, *Hydrated water(Soils), Soils, *Weathering(Soils).

The processes of weathering of the mineral mass of soils were studied. The content of hydrated water in soils was taken as an index of the weathering degree. An exponential form connection was established between the hydrated water content and possible energy expenses on soil formation. A straight-line connection was established between the hydrated water content and the energy of the lattice of the mineral mass of soil, except its part falling on silica.--Copyright 1975, Biological Abstracts, Inc.
W78-03658

PESTICIDE RECOVERY STUDIES FOR EVALUATION OF DEPARTMENT OF THE ARMY PESTICIDE MONITORING PROGRAM SOIL AND SEDIMENT ANALYSIS METHODOLOGY. PART I. DETERMINATION OF PESTICIDE AND POLYCLORINATED BIPHENYL RECOVERIES FROM SOIL EXTRACTED IMMEDIATELY FOLLOWING FORTIFICATION OCTOBER-DECEMBER 1976,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
For primary bibliographic entry see Field 5A.
W78-03667

TRACE ELEMENTS IN THE TERRESTRIAL ENVIRONMENT OF A COAL-FIRED POWERHOUSE,
Du Pont de Nemours (E. I.) and Co., Aiken, SC. Savannah River Lab.
For primary bibliographic entry see Field 5A.
W78-03677

2H. Lakes

COASTAL UPWELLING/DOWNWELLING CYCLES IN SOUTHERN LAKE SUPERIOR,
Wisconsin Univ., Madison. Marine Studies Center.
H. J. Niebauer, T. Green, and R. A. Ragotzkie.
Journal of Physical Oceanography, Vol 7, No 6, p 918-927, November 1977. 13 fig, 1 tab, 15 ref. NSF 33140.

Descriptors: *Lake Superior, *Upwelling, *Circulation, *Lakes, *Great Lakes, On-site investigations, On-site data collections, Data processing, Currents(Water), Water circulation,

Winds, Weather, Atmospheric pressure, Coasts, Temperature, Water temperature, Hydrography, Limnology, *Downwelling(Lakes).

Extensive current meter, hydrographic, and wind data were collected in the region of the Keweenaw Current, a stron coastal jet, during the late spring and early summer regime of Lake Superior. The data were compared with surface wind and pressure patterns over the region with the following conclusions: (1) Longshore winds associated with migrating low-pressure systems generate onshore Ekman transport and coastal downwelling. The coastal downwelling results in an intensification of the onshore internal pressure gradient, and consequently, the coastal jet. Speeds of over 75 cm/s are both observed and calculated, suggesting the Keweenaw Current, at these times, is in geostrophic equilibrium. (2) Longshore winds associated with migrating high-pressure systems generate offshore Ekman transport and coastal upwelling. Upwelling velocities of 13-50 m/day, an offshore surface transport layer of 10 m, a nearshore deceleration of the Keweenaw Current, and current direction fluctuations of near- and sub-inertial period are found associated with the upwelling. The period of passage of highs (Upwelling) and lows (downwelling) in July is about 4-6 days. This gives the Keweenaw Current the appearance of a pulsating coastal jet of period 4-6 days and amplitude about 60 cm/s. (Sims-ISWS)
W78-03239

LIMNOLOGICAL ASPECT OF WATER RESERVOIRS OF THE LAKE REGION BETWEEN LECZNA AND WLODAWA. PART I, (IN POLISH),
Akademia Rolnicza, Lublin (Poland). Inst. Biol. Rodstaw Prod. Zwierzecej.
G. Brzek.
Biul Lubel Towarzystwa Nauk Biol 18(2), p 79-84, 1976.

Descriptors: Reservoirs, Limnology, *Poland, Trophic levels, Lakes, Aquatic plants, Aquatic animals, Cretaceous substratum, Holocene, Oligotrophy, Pleistocene, Tropism.

The lakeland between Leczna and Wlodawa (Poland) often called the West Forestland, is an extensive depression of the terrain containing numerous water reservoirs. Lakes of this land occur in 2 river basins; the Wieprz Basin of 43 lakes and the Wlodawka Basin of 23 lakes. Most lie on Cretaceous substratum, are of karst orgin and go back to the Pleistocene or the Holocene period. The rest of the existing lakes are remnants of ancient lakes of the 1st or the 2nd interglaciation. The lakes are small but rather deep. They represent various stages of trophism. They progress from the stage of early eutrophy inclusively. Some of the lakes, particularly several peat-bogs, are in their original state and they have unique floral and faunal resources. The area is cut by the artificial Wieprz-Krzna channel. Some lakes receive fertile and alkaline water full of fauna and flora from the Wieprz River by means of the system of channels. The several years' investigations, carried out on those storage reservoirs by Lublin zoologists and botanists, were divided into 3 stages. The flora and fauna were listed before letting the water enter from the Wieprz. Mixing the lake flora and fauna with those of the river resulted in a mutual dislodgement of elements of the former biocenosis. The development of new biocenosis in the storage reservoirs was observed.--Copyright 1978, Biological Abstracts, Inc.
W78-03272

PROBLEMS OF HYDROBIOLOGICAL RESEARCH IN THE LAKE REGION BETWEEN LECZNA AND WLODAWA, (IN POLISH),
Akademia Rolnicza, Lublin (Poland). Zaklad Zologii and Hydrobiologii. and Akademia Rolnicza, Lublin (Poland). Zaklad Botaniki.
G. Brzek, C. Kowalczyk, S. Radwan, and I. Wojciechowski.
Biul Lubel Towarzystwa Nauk Biol 18(2), p 85-90, 1976.

Descriptors: *Hydrobiology, *Poland, Lakes, Aquatic plants, Aquatic animals, *Biomass, Chironomidae, Cladocera, Coleoptera, Copepoda, Crustaceans, Ecological, Ephemeroptera, Euphyllopoda, Fish, Hydracarina, Moss, Parasites, Phyto, Pisces, Plankton, Primary production, Rotatoria, Seasonal, Succession.

This lakeland containing 66 lakes differentiated by their genetics, age, physical, chemical, and biological properties was studied previously. Rotatoria, Euphyllopoda, Cladocera, Copepoda, Hydracarina, Coleoptera (aquatica), Chironomidae, Simuliidae, Ephemeroptera, Pisces and fish parasites were investigated. A great number of new and rare (for Poland) species were discovered. Some interesting observations were made on ecology, geographical zone, quantitative and qualitative seasonal changes in fauna in a whole years period, the succession of seasonal fauna and the dependence of the rate of development of planktonic animals and biomass upon the biotical and abiotical factors. Some species of rotifers can be indicators of lake trophism. All the lakes were classified according to the degradation degree on the basis of the interrelation between the maximum depth of 61 lakes and the rate of crustacean biomass in epilimnion. The botanists have worked out phytosocial characteristics of vascular plants in the lakes and peatbogs and the flora of mosses. They found numerous rare species and phytographic elements, chiefly Atlantic and boreal ones. Phytoplankton was examined microbiologically and algogically in a full years cycle with respect to the structure of the groups both in their contents and activities. The age of the lakes was estimated at 11,000 yr. Further investigations are carried out on the primary and secondary productions of 3 lakes differentiated by their trophisms.--Copyright 1978, Biological Abstracts, Inc.
W78-03287

WATER STRATIFICATION DURING INTENSIVE BREEDING OF FISH IN PONDS OF THE SOUTHEASTERN TURKMEN SSR, (IN RUSSIAN),
All-Union Research Inst. of Marine Fisheries and Oceanography, Moscow (USSR).
V. D. Stepanov, R. Charyev, and R. P. Stepanova.
Osvo Pustyn 6, p 53-59, 1976.

Descriptors: *Stratification, Fish ponds, Hydrogen ion concentration, Oxygen, Biogenic elements, *Carp, *USSR(SE Turkmenistan).

The water layers in pools of the Tedjhen farm (southeast Turkmenistan (USSR)), where the largest quantity of fish (carp) are bred, are characterized by distinct stratification due to variability in the content of O2, pH and biogenic elements.--Copyright 1978, Biological Abstracts, Inc.
W78-03298

FORESTED WETLANDS FOR WATER RESOURCE MANAGEMENT IN SOUTHERN ILLINOIS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
W. J. Mitsch, C. L. Dorge, and J. R. Wiemhoff.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 659, Price codes: A13 in paper copy, A01 in microfiche. University of Illinois Water Resources Center, Urbana, Report No. 132, November 1977. 275 p, 65 tab, 59 fig, 110 ref, append. OWRT A-088-ILL(1).

Descriptors: *Wetlands, Sedimentation rates, Floodplains, Water quality, Primary productivity, Ecosystems, Nutrients, Management, Water resources development, Forested wetlands, *Swamps, Primary productivity, *Cypress swamp, Phosphorus cycle, Taxodium, Hydrology budget, Flooding river, *Illinois, Non-point source loading, Duckweed.

A 30 ha cypress - tupelo (Taxodium distichum - Nyssa aquatica) floodplain swamp in Southern Illinois was studied for its hydrologic, biogeochemical and ecological characteristics. The hydrology, water chemistry, sediment dynamics and ecosystem productivity were described for the swamp and interactions with the adjacent Cache River were emphasized. A representative flood in the spring spilled water and sediments from the river to the swamp, temporarily reversing the normal flow of water from the swamp to the river. The annual hydrology budget for the swamp showed inflows of 74.4 cm throughfall, 63.9 cm runoff, and 21.9 cm groundwater; the outflows were 72.8 cm evapotranspiration, 54.9 cm surface outflow, and 21.0 cm groundwater, the latter two draining to the river. Loading rates for several chemical parameters were calculated from the swamp to the river and water chemistry of the swamp and river was contrasted. Primary productivity measurements showed high rates when the floating duckweed was included; cypress productivity was shown historically to be related to amount of flooding. A phosphorus budget was determined for the swamp and this indicated that the flooding river contributed over 10 times the phosphorus to the swamp as was discharged the rest of the year.
W78-03423

THE MEROMICTIC GREAT SALT LAKE,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
A. Lin.
Journal of Great Lakes Research, Vol 2, No 2, p 374-383, December 1976. 6 fig, 18 ref. OWRT A-029-UTAH(2), 14-31-0001-5045.

Descriptors: *Meromixis, *Great Salt Lake, *Chemical stratification, *Utah, Circulation, Water circulation, Salts, Seepae, Stratification, Dikes, Brackish water, Brines, Dissolved solids, Sodium, Chlorides, Chemicals, Lakes, Limnology, Ectogenic meromixis, Causeways.

The Great Salt Lake is an extreme case of ectogenic meromixis caused by diking. The formation and maintenance of the meromixis is largely due to a continuing supply of heavy blines from the North Basin to the monimolimnion of the South Basin. The meromictic stability of the South Basin is estimated to be 5700 g-cm/sq cm; the average entrainment rate is estimated at 4.62 x 10 to the minus 8th power m/sec, for a mean depth of 6.5 meters. The average entrainment rate appears to confirm Blanton's estimate. (Sims-ISWS)
W78-03446

THE STRUCTURE OF THE SPRING THERMAL BAR IN LAKE SUPERIOR, II,
Michigan Technological Univ., Houghton. Dept. of Biological Sciences.
J. D. Spain, G. M. Wernert, and D. W. Hubbard.
Journal of Great Lakes Research, Vol 2, No 2, p 296-306, December 1976. 12 fig, 24 ref. OWRT A-071-MICH(2).

Descriptors: *Lake Superior, *Water temperature, *Sampling, Lakes, Water circulation, Mixing, On-site investigations, Fluorescence, Temperature, Water pollution, Path of pollutants, Limnology, *Thermal bars, *Keweenaw Peninsula(Mich), Downwelling.

The thermal bar was studied during May and June of 1974 and 1975 near the Keweenaw Peninsula along the south shore of Lake Superior. Temperature distributions and distributions of naturally fluorescent material were measured in order to determine the nature of the energy and mass transport in the thermal bar zone. Transects were

located perpendicular to the thermal bar, and temperature was measured at 5 m intervals to a depth of 45 m using a thermistor probe with a 3 sec time constant interfaced with a signal conditioner and digital voltmeter. Accuracy in the range of 4C was + or - 0.01C. Water samples were collected, and the natural fluorescence arising from land runoff was measured. Station locations were determined by triangulation. Data for both temperature and fluorescence were plotted by a computer mapping program (SYMAP). The computer plotted temperature distributions provide the most detailed picture of the thermal bar thus far obtained. The complexity suggests considerable turbulence. A strong correlation between natural fluorescence and temperature supports the concept that little mixing occurs between inshore and offshore waters and that a significant portion of inshore waters and that a significant portion of inshore water arises from runoff. The bottom slope seems to have a strong influence on the flow near the thermal bar and on the rate of movement offshore. (See also W75-04038), (Sims-ISWS)
W78-03447

DIURNAL ZOOPLANKTON MIGRATION IN PONDS OF THE TURKMEN SSR, (IN RUSSIAN),
Akademiya Nauk Turkmensk i SSR, Ashkhabad. Inst. Zoologii i Parazitologii.
R. E. Muravleva.
Izv Akad Nauk Turkm Ssr Ser Biol Nauk 4, p 63-67, 1976.

Descriptors: *Zooplankton migration(Diurnal), Ponds, *USSR(Turkmen SSR), *Biomass, Water temperature.

Diurnal activity of zooplankton organisms (in the USSR) was investigated. The variations of zooplankton quantity and biomass were recorded. The maximal zooplankton concentration was registered in the evening at midnight, minimal from 12 to 6 p.m. The activity of zooplankton is influenced by feed factors, water temperature and ilumination.--Copyright 1978, Biological Abstracts, Inc.
W78-03453

LAKE CONSTANCE: ENDANGERMENT AND POSSIBILITIES FOR REHABILITATION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
For primary bibliographic entry see Field 5C.
W78-03464

THE IONIC COMPOSITION OF LAKES FED BY GROUND WATER AND PRECIPITATION IN THE UPPER ROMERIKE DISTRICT,
Oslo Univ. (Norway). Dept. of Limnology.
D. Hongve.
Nordic Hydrology, Vol. 8, No. 3, p 141-162, 1977. 6 fig, 9 tab, 30 ref.

Descriptors: *Water quality, *Water chemistry, *Lakes, *Geochemistry, *Chemical analysis, Analytical techniques, Chemistry, Precipitation(Atmospheric), Fallout, Runoff, Dissolved solids, Water analysis, Calcium, Chlorides, Magnesium, Sodium, Potassium, Geology, Sulfates, Salts, Foreign countries, Foreign research, *Norway, *Ionic composition, *Norwegian lakes, *Upper Romerike District(Norway).

In the Upper Romerike District the lakes possess widely different chemical characteristics depending on their hydrological conditions. The most dilute lakes are fed only by precipitation, and the more concentrated ones by groundwater. It was found that: in the precipitation fed lakes, the total ionic concentration was similar to that of the average precipitation, but the ionic ratio was different. Ionic sorption and exchange affected mostly calcium which decreased in concentration, while the monovalent ions increased. The groundwater fed lakes were dominated by bicarbonate, and their ionic proportions were constant regardless of total concentrations. The percentage composition was: Ca: 82%, Mg: 10.1%, Na: 6.5%, K: 1.4%, HC03: 78.3%, S04: 17.1%, C1: 4.6%. (Henley-ISWS)
W78-03471

LAKE ONTARIO BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
F. H. Quinn, and J. A. Derecki.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 782, Price codes: A03 in paper copy, A01 in microfiche. Technical Report No. ERL 365-GLERL 10, March 1976. 32 p, 6 fig, 16 tab, 1 ref, 1 append.

Descriptors: *Water levels, *Water storage, *Lake Ontario, *Great Lakes, Water level fluctuations, Gages, Gaging stations, Networks, Lakes, Water resources, Water supply, Watersheds(Basins), Limnology, Monthly water levels, Beginning-of-month water levels, Water-storage change rates.

Results were described of a study of Lake Ontario beginning-of-month water levels and monthly changes of storage. The study established that the number and distribution of water level gages in the presently existing gage network are adequate for the computation of beginning-of-month water levels. Computed beginning-of-month water levels and changes of storage for the period 1900-1974 were listed for use in scientific and planning studies. (Sims-ISWS)
W78-03474

THE LIMNOLOGY OF GRAND TRAVERSE BAY, LAKE MICHIGAN,
Michigan Univ., Ann Arbor. Sea Grant Program.
M. T. Auer, R. P. Canale, and P. L. Freedman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 814, Price codes: A12 in paper copy, A01 in microfiche. Technical Report No 47 MICHU-SG-76-200, 1976. 262 p, 83 fig, 37 tab, 199 ref, 2 append.

Descriptors: *Lake Michigan, *Bays, *Limnology, Surveys, Sampling, Geology, Circulation, Hydrology, Water pollution, Water pollution sources, Nutrients, Phytoplankton, Zooplankton, Benthos, Sediments, Chemical properties, Physical properties, Aquatic biology, *Grand Traverse Bay(Mich).

The report contained 17 chapters divided into 3 sections. The first section contained the summary, introduction, and chapters dealing with the geologic, morphometric, and circulatory charcteristics of the bay. The following two chapters presented methods of analysis and data management. This section also contained a detailed discussion of the hydrology and contaminant sources to the bay. The second section was a summary of general water quality in the bay. Results of chemical analyses for trace metals, algal growth nutrients, and major ions were presented. A summary of findings regarding phytoplankton, zooplankton, coliform bacteria, benthos, and surficial sediments was provided. The third section was a collection of individual reports describing in detail findings regarding phytoplankton, zooplanton, benthos, and surface sediments. Each chapter is self-standing and serves as an in-depth report of a particular facet of the limnology of Grand Traverse Bay. Appendix A presented references used in the compilation of tables of general values, and Appendix B was a bibliography of Michigan Sea Grant reports and papers of Grand Traverse Bay. (Sims-ISWS)
W78-03487

GRAND TRAVERSE BAY LIMNOLOGICAL DATA,
Michigan Univ., Ann Arbor. Sea Grant Program.
M. T. Auer, R. P. Canale, and P. L. Freedman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 783, Price codes: A05 in paper copy, A01 in microfiche. Technical Report No. 48, MICHU-SG-76-201, March 1976. 92 p, 1 fig, 8 tab.

Descriptors: *Lake Michigan, *Bays, *Limnology, *Data collections, *Great Lakes, On-site investigations, On-site data collections, Physical properties, Chemical properties, Primary productivity, Secchi disks, Chlorophyll, Phytoplankton, Zooplankton, Benthos, Sampling, Lakes, Aquatic biology, Water pollution, *Grand Traverse Bay(Mich).

A listing was presented of the latitude, longitude, and depth of sampling stations used in the Michigan Sea Grant field program on Grand Traverse Bay. A map of the sampling stations was provided as well as the date of each sampling cruise. In addition to these materials, portions of the data files used in preparing the report, 'The Limnology of Grand Traverse Bay, Lake Michigan' (Michigan Sea Grant Technical Report Number 47), were presented. The following data files were included: physical/chemical data, primary productivity (including Secchi disc and light measurements), chlorophyll a, total phytoplankton, total zooplankton, and benthos. The complete phytoplankton and zooplankton files were too voluminous to be included in this publication. The data, however, are available on card files at the Michigan Sea Grant Program in Ann Arbor, Michigan. (Sims-ISWS)
W78-03488

LARGE-SCALE CURRENT MEASUREMENTS IN LAKE SUPERIOR,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
P. W. Sloss, and J. H. Saylor.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 815, Price codes: A04 in paper copy, A01 in microfiche. Technical Report No. ERL 363-GLERL 8, January 1976. 55 p, 24 fig, 2 tab, 7 ref.

Descriptors: *Currents(Water), *Water circulation, *Lake Superior, *Great Lakes, Current meters, Measurement, Surveys, Temperature, Water temperature, Thermal stratification, Winds, Weather, Flow, Limnology, Oscillatory currents.

Analyses of current meter data collected in Lake Superior in 1967 and 1973 showed a general counterclockwise circulation covering most of the lake. The following observations were reported: currents near the shore are strong (exceeding 10 cm/s for a half-month vector average) and generally parallel to the isobaths. Open-lake currents show strong periodic motions at the local inertial frequency. An interesting periodicity is seen in the currents between Isle Royale and the northern shore. Oscillatory components observed there are driven by inertial motions when the lake becomes thermally stratified in late summer, but in spring they show periodicities related to the first and sixth free surface modes of the lake. Other persistent features of the measured flow patterns are the Keweenaw Current and a general strengthening of summertime flows as the lake becomes stratified. (Sims-ISWS)
W78-03490

PHYTOPLANKTON OF THE BRITAJIAN RESERVOÏR (THE NORTHERN DONETS RIVER), (IN RUSSIAN),
Kharkov State Univ. (USSR).
For primary bibliographic entry see Field 5C.
W78-03603

STRONTIUM-90 CONCENTRATIONS IN THE BOTTOM BRINE AND SEDIMENTS OF LAKE SIVASH AS DEPENDENT ON THE HYDROCHEMICAL ENVIRONMENT, (IN RUSSIAN),
For primary bibliographic entry see Field 5A.
W78-03611

ZOOPLANKTON OF THE LOWER VOLGA, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Inst. Rybnogo Khozyaistva, Astrakhan (USSR).
For primary bibliographic entry see Field 5C.
W78-03618

FEEDING OF THE PERCH AND RUFF IN THE DISCHARGE ZONE OF THE KURAKHOVO STATE REGIONAL ELECTRIC POWER STATION, (IN RUSSIAN),
Kiev State Univ. (USSR).
For primary bibliographic entry see Field 5C.
W78-03622

TOTAL PHOSPHORUS MODEL FOR THE GREAT LAKES,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W78-03643

THE PHYTOSOCIOLOGY OF THE GREEN SWAMP, NORTH CAROLINA,
Bureau of Sport Fisheries and Wildlife Research Center, Jamestown, ND.
R. L. Kologiski.
North Carolina Agricultural Experiment Station Technical Bulletin No 250, December 1977, Raleigh, N.C. 101 p. 17 fig, 6 tab, 75 ref, 1 append.

Descriptors: *Swamps, *Trees, Soil types, Burning, Classification, Wetlands, North Carolina, *Phytosociology, *Green Swamp(NC), *Pocosin, *Hydroperiod, *Coastal wetlands, Bog, Pine savannah, Bay forest.

Vegetation types, typical of what once covered several thousand square miles of the lower coastal plain of North Carolina are delineated and described. Sampling was by the releve method using 221 sample plots subjectively located according to vegetation, soil type, disturbance, and accessibility. Data collected were cover values based on a modified Braun-Blanquet cover estimation technique. Gradient analysis indicated a definite relationship between vegetation type and soil type, hydroperiod, and fire. Hydroperiod is probably the most important factor and, to some extent, controls the effects of fire on vegetation. A gradient was defined ranging from mineral soils with short hydroperiods to deep organic soils with long hydroperiods. Vegetation was classified into 14 community types based on a new hierarchical classification of natural areas by A. E. Radford. (Stihler-Mass)
W78-03655

MARSH MANAGEMENT FOR WILDLIFE: A BIBLIOGRAPHY WITH ABSTRACTS,
Louisiana Cooperative Wildlife Research Unit, Baton Rouge.
For primary bibliographic entry see Field 2L.
W78-03656

THE LAGOON OF BAGES-SIGEAN, A MODEL OF A MEDITERRANEAN LAGOON, (IN FRENCH),
Arago Lab., Banyuis-sur-Mer (France).
H. Boutiere.
Vie Milieu Ser B Oceanogr. 24(1B), p 23-58, 1974.

Descriptors: Sediments, Winds, Rain, Climates, *Lagoons, *Mediterranean lagoons, Model studies, Vegetation, *Bages-Sigean Lagoon(France).

A lagoon basin of the French Mediterranean shore is described in its geological context and with its sedimentary contents, vegetation and climate. The role of the wind and the rain, as well as the existence of 2 types of shore, facing one another, are presented.--Copyright 1975, Biological Abstracts, Inc.
W78-03668

THE SILVER FLOWE. II FEATURES OF THE VEGETATION AND STRATIGRAPHY OF BRISHIE BOG, AND THEIR BEARING ON POOL FORMATION,
Hull Univ. (England). Dept. of Plant Pathology.
For primary bibliographic entry see Field 5C.
W78-03699

LIMITATIONS OF MACROPHYTES IN A EUTROPHIC LAKE, LOCH LEVEN. II. WAVE ACTION, SEDIMENTS, AND WATERFOWL GRAZING,
Saint Andrews Univ. (Scotland). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W78-03700

2I. Water In Plants

MARINE FISH CULTURE AND ARTIFICIAL REPRODUCTION FOR THE EXPLOITATION OF ORBETELLO (GR) LAGOON, (IN ITALIAN),
Parma Univ. (Italy). Ist. di Zoologia.
G. Alessio.
Ateneo Parmense Acta Nat 12(4), p 315-332, 1976.

Descriptors: *Marine fish, *Fish reproduction, Euryhaline fish, Fish growth, Fish eggs, Fish hatcheries, Age, Fry, Haline, Hormone, *Italy(Orbetello Lagoon), Maturation, Migration, Morone-labrax, Mugil-cephalus, Mugilidae.

To asses the potential of Orbetello Lagoon (Italy) for breeding euryhaline fishes, the catch and migration of Morone labrax and Mugil cephalus were studied. Growth compared to age, sexual maturation and fertility (measured as number of eggs produced) were studied. Results are discussed in terms of oganizing a station for gathering breeders (particularly Mugilidai) for hormonal treatment or building a hatchery for producing fry.--Copyright 1978, Biological Abstracts, Inc.
W78-03235

RATES AND PATTERNS OF WATER UPTAKE IN A DOUGLAS-FIR FOREST,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W78-03250

RETENTION OF SOIL WATER FOLLOWING FOREST CUTTING,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 2G.
W78-03252

A HYDROPONIC STUDY OF HEAVY METAL UPTAKE BY SELECTED MARSH PLANT SPECIES,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
C. R. Lee, T. C. Sturgis, and M. C. Landin.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 224, Price codes: A04 in paper copy, A01 in microfiche. Technical Report D-76-5, June 1976. 64 p, 10 fig, 15 tab, 16 ref, 1 append.

Descriptors: *Absorption, *Hydroponics, *Marsh plants, *Aquiculture, *Plant growth, *Heavy metals, Lead, Nickel, Water pollution sources, Chemical wastes, Environment, Amphibious plants, Ecology, Plant groupings, Aquatic environment, Aquatic habitats, Cadmium, Zinc, Chemical analysis.

Eight marsh plants were grown in chemically controlled hydroponic solutions containing three concentrations of heavy metals to evaluate the ability of each plant species to take up and to accumulate heavy metals. The marsh plants studied were Cyperus esculentus, Scirpus validus, Spartina patens, Scirpus robustus, Distichlis spicata, Triglochin maritima, Spartina alterniflora, and Spartina foliosa. The heavy metals studied were zinc, cadmium, nickel, lead, and chromium, each at a concentration of 0.0, 0.5, and 1.0 ppm. Marsh plants were exposed to heavy metals for 6 weeks and harvested. Plants were separated into tops, lower stems, rhizomes, tubers, and roots and were analyzed for heavy metals to locate plant parts where heavy metals may accumulate. Exposure to heavy metals adversely affected the growth of S. validus, S. patens, D. spicata, and S. alterniflora more than the other plant species evaluated. The species that appeared to have more potential in taking up zinc, cadmium, and nickel were C. esculentus, S. patens, D. spicata, and to some extent S. alterniflora. Lead and chromium accumulated in the roots of all species with very little translocation into plant tops. Phosphorus and iron content in the roots appeared to be a major factor in determining the ability of a marsh plant to translocate heavy metals from the roots into other plant parts. (Henley-ISWS)
W78-03258

WATER CAPACITY OF MOUNTAIN-FOREST AND MEADOW SOILS OF THE NORTHERN CAUCASUS, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W78-03345

SHORT- AND LONG-TERM EFFECTS OF ANTITRANSPIRANTS ON WATER RELATIONS AND PHOTOSYNTHESIS OF WOODY PLANTS,
Wisconsin Univ.- Madison. Dept. of Forestry.
W. J. Davies, and T. T. Kozlowski.
J Am Soc Hortic Sci. 99(4), p 297-304, 1974.

Descriptors: *Antitranspirants, Effects, Pine trees, *Photosynthesis, *Pinus-resinosa, Stomatal, Wax, *Woody plants.

Each of 8 antitranspirants reduced transpiration of 2 spp. of woody plants. Dow Silicone and CS 6432 were the most effective compounds on Fraxinus americana and Dow Silicone was effective on Pinus resinosa. Keykote, Folicote and Improved Wilt Pruf showed an increased effect on plant water loss and net photosynthesis (measured by net CO_2 uptake) of P. resinosa up to 8 days after compound application. Thereafter there was no significant change in the effect of any compound on transpiration or photosynthesis. Effects on F. americana of all compounds except Improved Wilt Pruf decreased with time after application. Scanning electron micrographs of treated leaves suggested that antitranspirant films on F. americana leaves cracked over the guard cell pore, accounting for the decrease in compound effect with time. Antitranspirants apparently reduced water loss of P. resinosa by combining with wax in the stomatal pore and forming an impermeable plug. The compounds tested were toxic to F. americana seedlings and photosynthesis of treated plants decreased with time, even when direct physical effect of a compound had worn off P. resinosa seedlings showed no decrease in photosynthesis with time. F. americana plants treated with Keykote exhibited low rates of water loss and transpiration/photosynthesis ratios that were not significantly different from those of control plants. Folicote was toxic, and Clear Spray increased

water loss of F. americana seedlings. Dow Silicone reduced water loss of Pinus seedlings by about 80%, and plants treated with Dow Silicone, Improved Wilt Pruf, Keykote, or Folicote had favorable transpiration/photosynthesis ratios. The effects of antitranspirants on transpiration and photosynthesis were greatly influenced by environmental regimes and by species.--Copyright 1974, Biological Abstracts, Inc.
W78-03642

SALT-MARSH PLANT GERATOLOGY,
Georgia Univ., Brunswick. Marine Extension Service.
For primary bibliographic entry see Field 2L.
W78-03654

THE PHYTOSOCIOLOGY OF THE GREEN SWAMP, NORTH CAROLINA,
Bureau of Sport Fisheries and Wildlife Research Center, Jamestown, ND.
For primary bibliographic entry see Field 2H.
W78-03655

WATER BIRDS AND THEIR WETLAND RESOURCES IN RELATION TO OIL DEVELOPMENT AT STORKERSEN POINT, ALASKA,
Iowa State Univ., Ames. Dept. of Animal Ecology.
For primary bibliographic entry see Field 5C.
W78-03657

ENERGY VALUE, ELEMENTAL COMPOSITION, AND PRODUCTIVITY OF BELOW-GROUND BIOMASS OF A JUNCUS TIDAL MARSH,
Mississippi State Univ., Mississippi State. Dept. of Zoology.
For primary bibliographic entry see Field 2L.
W78-03659

2J. Erosion and Sedimentation

PHYSICAL FACTORS AFFECTING DREDGED MATERIAL ISLANDS IN A SHALLOW WATER ENVIRONMENT,
Texas A and M Univ., College Station. Dept. of Geology.
For primary bibliographic entry see Field 5E.
W78-03227

HEAVY METAL SEDIMENTATION IN SAANICH INLET MEASURED WITH 210PB TECHNIQUE,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
For primary bibliographic entry see Field 5B.
W78-03245

PB210-DETERMINED SEDIMENTATION RATE, AND ACCUMULATION OF METALS IN SEDIMENTS AT A STATION IN CHESAPEAKE BAY,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-03247

RESEARCH NEEDS IN EROSION AND SEDIMENTATION.
American Geophysical Union, Washington, DC.
EOS, Vol. 58, No. 12, p 1076-1083, December 1977.

Descriptors: *Erosion, *Sedimentation, *Research and development, Watersheds(Basins), Mudflows, Sediment yield, Sediment transport, Streams, Rivers, Channel morphology, Scour, Model studies, Reservoir silting, Dredging, Coasts, Estuaries, *Research needs(Erosion and sedimentation).

Erosion and sedimentation are important problems in environmental and water quality studies, watershed management, river mechanics and training, reservoir planning, and dredging in waterways and harbors. The importance of these problems is being magnified by the increasing demands for energy and foods, which in turn require an increased water supply. Discussion of erosion and sedimentation problems, in which research is needed, included basic mechanics of mudfloe, sediment yield predictive equations, estimation of sediment transport rate, river morphology and channel stability, model studies for scour and sedimentation, sedimentation and related problems affected by reservoirs, dredging and disposal operations, occurrence and control of scour near structures, transport of large-size particles such as coal in large-size pipelines, transport of pollutants absorbed by sediments, trapping of fine sediments (silts and clays) by structures, and sediment problems in coastal regions. (Humphreys-ISWS)
W78-03248

ANALYSIS OF SHORT-TERM VARIATIONS IN BEACH MORPHOLOGY (AND CONCURRENT DYNAMIC PROCESSES) FOR SUMMER AND WINTER PERIODS, 1971-72, PLUM ISLAND, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
For primary bibliographic entry see Field 2L.
W78-03255

DREDGED SEDIMENT MOVEMENT TRACING IN SAN FRANCISCO BAY UTILIZING NEUTRON ACTIVATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Weapons Effects Lab.
For primary bibliographic entry see Field 5B.
W78-03257

SELECTIVE ANALYTICAL PARTITIONING OF SEDIMENTS TO EVALUATE POTENTIAL MOBILITY OF CHEMICAL CONSTITUENTS DURING DREDGING AND DISPOSAL OPERATIONS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-03259

A TEST PARTICLE DISPERSION STUDY IN MASSACHUSETTS BAY.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W78-03270

ECOSYSTEMS AND RESOURCES OF THE MASSACHUSETTS COAST,
Massachusetts Office Coastal Zone Management, Boston. Inst. for Man and Environment.
For primary bibliographic entry see Field 2L.
W78-03274

NUMERICAL MODELING OF DISPERSION IN STRATIFIED WATERS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 5B.
W78-03278

SOME REASONS FOR DEVELOPMENT OF IRRIGATION EROSION, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
L. M. Dremailova.
Izv Sib Otd Akad Nauk SSSR Ser Biol Nauk 2, p 19-22, 1976.

Descriptors: *Irrigation practices, *Soil erosion, *Sprinkler irrigation, *Climates, Rain, Slopes, White cabbage, Winds.

Long-range sprinkler heads give rise to heavy outwash (in white cabbage plantings). This is explained by high irrigation rates, heavy wind effects and low coefficients of rain uniformity. It is reasonable to use short- and medium-spray sprinklers on slopes.--Copyright 1978, Biological Abstracts, Inc.
W78-03329

ERODIBILITY OF SELECTED CLAY SUBSOILS IN RELATION TO PHYSICAL AND CHEMICAL PROPERTIES,
Agricultural Research Service, Oxford, MS. Sedimentation Lab.
M. J. M. Romkens, C. B. Roth, and D. W. Nelson.
Soil Science Society of America Journal, Vol. 41, No. 5, p 954-960, September-October 1977. 2 fig, 6 tab, 21 ref.

Descriptors: *Soil erosion, *Subsoil, *Physical properties, *Chemical properties, *Clays, Laboratory tests, Regression analysis, Chemical analysis, Soils, Equations, Soil properties, Soil physics, Chemistry, *Erodibility(Subsoils).

Predictions of soil erodibility factors for selected clay subsoils were studied in relation to physical and chemical properties. Erodibility factors were determined from soil erosion rates on scalped surfaces during a series of simulated rainstorms. Subsoils were analyzed for their textural, chemical, and mineralogical composition. A predictive model, derived from previously gathered data of 46 surface soils, was used to determine the significance of soil properties in predicting subsoil erodibility. Weighted linear regression analysis using data from surface soils of the test model and 7 selected subsoils indicated that a textural parameter and the percent of iron plus aluminum extractable with citratedithionite-bicarbonate (CDB) were significant prediction properties of erodibility for these clay subsoils. Multiple linear regression yielded a prediction equation with a coefficient of multiple determination of R sq = 0.90. (Sims-ISWS)
W78-03461

VEGETATION ESTABLISHMENT AND SHORELINE STABILIZATION: GALVESTON BAY, TEXAS,
Texas A and M Univ., College Station. Dept. of Range Science.
For primary bibliographic entry see Field 2L.
W78-03475

SLACK WATER SEDIMENTS IN THE ALPOWA CREEK DRAINAGE, WASHINGTON,
Washington State Univ., Pullman. Dept. of Anthropology.
L. L. Foley.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 240, Price codes: A04 in paper copy, A01 in microfiche. Master's Thesis, June 1976. 73 p, 13 fig, 2 tab, 51 ref, 1 append. CX 8880-6-0015.

Descriptors: *Geologic history, *Sedimentary structures, *Stratigraphy, *Mineralogy, *Geomorphology, *Washington, Archeology, Flooding, Geology, History, Backwater, *Slack water sedimentation, *Snake River, *Alpowa Creek(Wash), Lower granite dam, Lacustrine deposits, Back water flooding.

Six geologic units in the Alpowa drainage, Washington, were describedin terms of stratigraphic position, geomorphic expression, sedimentary structures, estimated particle size, lithology, and elevation. Two episodes of 'slack water' deposition are recognized in the Alpowa drainage. Prior to deposition of the Upper Slack

Water Unit, the following conditions predominated: mass wasting on the canyon walls, deposition of large coalescent alluvial fans, and aggradation by tributary streams. Tephra found in the floodplain alluvium stratigraphically below the Upper Slack Water Unit in Steptoe canyon is correlated tentatively with Mount St. Helens set X. An early episode of slack water deposition is represented by the Lower Slack Water Unit. The structure, particle size, and geomorphic expression of this unit suggest deposition in a lacustrine environment; however, a floodplain environment cannot be dismissed. Tephra layers found in the Lower Slack Water Unit have allowed correlation of the unit at 6 localities in the Alpowa drainage. Stratigraphic position, petrographic characteristics, and chemical composition of the tephra are different from the tephra found in Steptoe canyon, suggesting that they belong to distinct Mount St. Helens tephra sets. (Adams-ISWS)
W78-03476

SHOALING CHARACTERISTICS OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W78-03485

CRYOGENIC SEDIMENT SAMPLER,
Department of Agriculture, Washington, DC. Office of the Secretary. (Assignee).
W. J. Walkotten.
U.S. Patent No. 4,038,875, 4 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 72, August 2, 1977.

Descriptors: *Patents, *Sampling, *Sediments, Cryogenics, Freezing, Equipment, Streams, Lakes, On-site tests, Probes.

A stream bed sediment sampler easily obtains a nearly undisturbed, stratified sample containing stream gravel, intergravel water, and organic material. The temperature of a probe inserted into the sediment is quickly reduced to a point where the material immediately surrounding the probe freezes and clings to the probe upon its removal from the stream bed. The sediment sampling apparatus comprises a first tube of heat-conducting material open at one end and closed at the other, a second tube open at one end and closed at the other. The second tube loosely fits inside the first tube so that the closed end of the second tube is in close proximity to the closed end of the first tube. Nozzles in an array are located near the closed end of the second tube. The nozzles are of a size which allows a controlled release of a gas under pressure from inside the second tube. Connected to the second tube is a means for delivering a gas under a pressure sufficient to decrease the temperature of the gas to below the freezing point of water when the gas is released to the atmosphere through the nozzles. (Sinha-OEIS)
W78-03601

STRONTIUM-90 CONCENTRATIONS IN THE BOTTOM BRINE AND SEDIMENTS OF LAKE SIVASH AS DEPENDENT ON THE HYDROCHEMICAL ENVIRONMENT, (IN RUSSIAN),
For primary bibliographic entry see Field 5A.
W78-03611

IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM, TUCSON, ARIZONA, JULY 9, 1977.
For primary bibliographic entry see Field 4C.
W78-03661

PESTICIDE RECOVERY STUDIES FOR EVALUATION OF DEPARTMENT OF THE ARMY PESTICIDE MONITORING PROGRAM SOIL AND SEDIMENT ANALYSIS METHODOLOGY. PART I. DETERMINATION OF PESTICIDE AND POLYCLORINATED BIPHENYL RECOVERIES FROM SOIL EXTRACTED IMMEDIATELY FOLLOWING FORTIFICATION OCTOBER-DECEMBER 1976,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
For primary bibliographic entry see Field 5A.
W78-03667

INFLUENCE OF THE SEDIMENT/WATER INTERFACE ON THE AQUATIC CHEMISTRY OF HEAVY METALS,
New England Aquarium, Boston, MA.
For primary bibliographic entry see Field 5B.
W78-03678

2K. Chemical Processes

DEUTERIUM IN HAILSTONES COLLECTED ON 29 NOVEMBER 1972,
National Physical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 2B.
W78-03246

THE IONIC COMPOSITION OF LAKES FED BY GROUND WATER AND PRECIPITATION IN THE UPPER ROMERIKE DISTRICT,
Oslo Univ. (Norway). Dept. of Limnology.
For primary bibliographic entry see Field 2H.
W78-03471

WATER SAMPLER DEVICE,
For primary bibliographic entry see Field 7B.
W78-03596

INFLUENCE OF THE SEDIMENT/WATER INTERFACE ON THE AQUATIC CHEMISTRY OF HEAVY METALS,
New England Aquarium, Boston, MA.
For primary bibliographic entry see Field 5B.
W78-03678

2L. Estuaries

PHYSICAL FACTORS AFFECTING DREDGED MATERIAL ISLANDS IN A SHALLOW WATER ENVIRONMENT,
Texas A and M Univ., College Station. Dept. of Geology.
For primary bibliographic entry see Field 5E.
W78-03227

A NEW CONCEPT FOR DREDGED MATERIAL DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5E.
W78-03228

DREDGING OPERATIONS IN THE GALVESTON DISTRICT,
Army Engineer District, Galveston, TX.
For primary bibliographic entry see Field 5G.
W78-03229

DREDGE MATERIAL CONTAINMENT IN NYLON BAGS IN THE CONSTRUCTION OF MINI-PROJECTS FOR BEACH STABILIZATION,
North Carolina State Univ. at Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03230

THE NATIONAL DREDGING STUDY,
Office of the Chief of Engineers (Army), Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03231

USE OF REMOTE SENSING IN EVALUATING TURBIDITY PLUMES,
Texas A and M Univ., College Station. Coastal, Hydraulic and Ocean Engineering Group.
W. P. James.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 181-193, December 1976. 4 fig.

Descriptors: *Remote sensing, *Turbidity currents, *Texas, *Aerial photography, Currents(Water), Velocity, Water quality, Dredging, Turbidity, Surveys, Measurement, Methodology, On-site tests, Turbidity plumes.

Aerial monitoring can be used to study not only objects, but also processes. Mixing and circulation patterns in lakes and coastal waters often can be observed by the natural variation in turbidity of the water. The effluent plume from coastal streams can be studied to obtain a better understanding of the dispersion process and longshore currents. Dye drops from an aircraft can be used to compute water currents and diffusion coefficients. Experience has shown that a 35 mm, handheld camera taking oblique photos from a 500-ft altitude can be used to give reliable turbidity values in water. This procedure can be used to quantitatively evaluate tubidity planes for dredging operations or natural sources. Aerial photography has an advantage over conventional sampling in that it provides an elevated vantage point. It provides an easy method for determining the relative impact of dredging activity by comparison plumes with man-generated turbidity plumes. (See also W77-09325) (Humphreys-ISWS)
W78-03232

HYDROLOGIC AND SEDIMENTOLOGIC STUDY OF THE OFFSHORE DREDGE DISPOSAL AREA, SAVANNAH, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5E.
W78-03233

AQUATIC DISPOSAL OF DREDGED MATERIAL: RELEASE OF CONTAMINANTS DURING AND AFTER DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5B.
W78-03234

EDGE WAVES IN THE PRESENCE OF AN IRREGULAR COASTLINE,
British Columbia Univ., Vancouver. Dept. of Mathematics.
J. D. Fuller, and L. A. Mysak.
Journal of Physical Oceanography, Vol 7, No 6, p 846-855, November 1977. 4 fig, 8 ref.

Descriptors: *Waves(Water), *Ocean waves, *Coasts, *Model studies, Mathematical models, Continental shelf, Mathematics, Stochastic processes, Equations, Wavelengths, Energy, Oceanography, Coastal irregularities.

Reported herein was the examination of the generation of trapped edge waves on a continental shelf when a long wave from the deep ocean reaches an irregular coast and alterations in the propagation characteristics of trapped edge waves due to the coastal irregularities. The continental

shelf was modeled by a single flat-step model, and the coast was straight except for irregularities represented as a centered stationary random function of distance along the coast. The relevant boundary value problems was thus stochastic, with the randomness introduced through the boundary condition at the coast. The power flux into trapped edge waves and into a continuous spectrum of leaky modes, both generated by the scattering of an incident wave from the deep ocean, was found. Numerical results, assuming a Gaussian spectrum for coastal irregularities, indicated that there is less power transferred to the forward traveling trapped wave than the backward one, and less power to the scattered leaky modes than to either the forward or backward traveling trapped modes. The attenuation coefficient of a trapped edge wave, the 'tilting' of the wave toward the coast, and the correction to the dispersion relation due to the coastal irregularities were obtained. The results are valid for wave periods much shorter than the period associated with the Coriolis parameter and for wavelengths much greater than the average size of the coastal irregularities. (Sims-ISWS)
W78-03236

LONG COASTAL-TRAPPED WAVES OFF THE WEST COAST OF THE UNITED STATES, SUMMER 1973,
Johns Hopkins Univ., Baltimore, MD. Chesapeake Bay Inst.
D-P. Wang, and C. N. K. Mooers.
Journal of Physical Oceanography, Vol 7, No 6, p 856-864, November 1977. 8 fig, 16 ref. NSF OCE76-82151.

Descriptors: *Waves(Water), *Ocean waves, *Coas's, *Pacific Ocean, On-site investigations, Model studies, Mathematical models, Data processing, Winds, Atmospheric pressure, Continental slope, Sea level, Water levels, Water level fluctuations, Oceanography, *Coastal-trapped waves, *West coast(US).

Evidence for long coastal-trapped waves off the west coast of the United States was obtained from sea level, surface atmospheric pressure, and wind records over a 1500 km alongshore separation for two months in the summer of 1973. Corresponding evidence was obtained from current measurements off the northern Oregon coast. The dominant low-frequency motion occurred at a period of 10 days. Consistent with the theory of coastal-trapped waves, the observations indicate that: (1) the alongshore current fluctuations were mainly barotrapic, coastally trapped, and were related geostrophically to the adjusted sea level fluctuations; and (2) the adjusted sea level fluctuations propagated northward with a phase speed which depended upon the local shelf geometry. The 10-day fluctuations in the coastal ocean were driven by the northward traveling, large-scale winds; the response was nonlocal. There were also 4-day fluctuations for which the coastal water response was essentially local. The difference in response characteristics for the two periods can be explained with simple forced wave theory. (Sims-ISWS)
W78-03237

THE TRANSFER OF ENERGY AND MOMENTUM BY THE WIND TO THE SURFACE MIXED LAYER,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Oceanography.
J. Richman, and C. Garrett.
Journal of Physical Oceanography, Vol 7, No 6, p 876-881, November 1977. 1 fig, 1 tab, 13 ref.

Descriptors: *Energy transfer, *Momentum transfer, *Winds, *Ocean waves, *Model studies, Mathematical models, Currents(Water), Wind pressure, Waves(Water), Ocean currents, Energy, Drag, Mixing, Oceanography, *Surface mixed layer.

During the initial stages of the deepening of the surface mixed layer, the rate of increase of potential energy is proportional to the input of energy to the mixed layer by the wind. In an attempt to reconcile an apparent discrepancy between the rate of deepening in laboratory experiments and in the ocean, a simple model for the momentum and energy transfer by the wind to surface waves and the mixed layer was suggested. The net transfer of momentum is the wind stress less the local growth of surface wave momentum and the divergence of the surface wave momentum flux; and the net energy transfer is the work done on the waves by the wind less the local growth of surface wave energy, the divergence of the surface wave energy flux, and the viscous dissipation of the waves. Using the JONSWAP wave observations, the net momentum transfer is 97% of the wind stress. Using a simple momentum transfer function, allowing direct generation of long gravity waves and capillary-gravity waves, to estimate work done on the waves, the energy actually transferred to the mixed layer is a few percent of the wind stress times the 10 m wind speed. The oceanic and laboratory rates of deepening of the mixed layer appear roughly consistent. (Sims-ISWS)
W78-03238

HEAVY METAL SEDIMENTATION IN SAANICH INLET MEASURED WITH 210PB TECHNIQUE,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
For primary bibliographic entry see Field 5B.
W78-03245

OBSERVATIONS OF THE MIXING IN THE BALTIC THERMO- AND HALOCLINE LAYERS,
Copenhagen Univ., Denmark. Inst. of Physical Oceanography.
For primary bibliographic entry see Field 5B.
W78-03254

ANALYSIS OF SHORT-TERM VARIATIONS IN BEACH MORPHOLOGY (AND CONCURRENT DYNAMIC PROCESSES) FOR SUMMER AND WINTER PERIODS, 1971-72, PLUM ISLAND, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
R. W. Abele, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A039 266, Price codes: A06 in paper copy, A01 in microfiche. Army Corps of Engineers, Coastal Engineering Research Center Miscellaneous Report No. 77-5, March 1977. 101 p, 83 fig, 1 tab, 24 ref. CERC DACW 72-71-C-0023.

Descriptors: *Beaches, *Geomorphology, *Beach erosion, *Massachusetts, On-site investigations, Profiles, Coasts, Waves(Water), Currents(Water), Ocean waves, Weather, Winds, Erosion, Sedimentation, Sands, Shores, Barrier island, *Plum Island(Mass), Beach morphology, Beach profiles.

An analysis of the relationship between wave and meteorological variables and beach morphology was undertaken during summer and winter periods, 1971-72, on Plum Island, Massachusetts. Variables were measured or computed bihourly, 24 hours per day, throughout both study periods. The variables were wave period, wave height, breaker type, breaker angle, longshore current velocity, wave steepness, breaker power, windspeed and direction, barometric pressure, air and water temperature, and groundwater elevation. Daily topographic maps of the intertidal zone were constructed for 12 beach profiles spaced at 60-meter intervals. Variations in beach process variables, during both the summer and winter periods, were related directly to the passage of high- and low-pressure systems and to the proximity of the systm to Plum Island. With an increase in breaker power and breaker steepness, the high tide beach-face gradient increased. Increases in breaker power also resulted in a rise in the level of the groundwater surface. Although most process variables were similar for the summer and winter periods, strong offshore winds and extreme low temperatures that accompany polar high-pressure systems were unique to the winter period. Differences in beach morphology within a small area appear to reflect the state of recovery of the beach profiles after a storm. Adjacent profiles at different stages of maturity are controlled by the proximity of the nearshore bar. The closer the bar is to shore, the faster the sediment is returned to the beach zone. (Sims-ISWS)
W78-03255

DREDGED SEDIMENT MOVEMENT TRACING IN SAN FRANCISCO BAY UTILIZING NEUTRON ACTIVATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Weapons Effects Lab.
For primary bibliographic entry see Field 5B.
W78-03257

EVALUATION OF SAFETY FACTORS WITH RESPECT TO OCEAN DISPOSAL OF WASTE MATERIALS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W78-03269

A TEST PARTICLE DISPERSION STUDY IN MASSACHUSETTS BAY.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W78-03270

A PILOT STUDY ON THE DESIGN OF A PETROLEUM HYDROCARBON BASELINE INVESTIGATION FOR NORTHERN PUGET SOUND AND STRAIT OF JUAN DE FUCA,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W78-03271

GEOGRAPHIC AREAS OF PARTICULAR CONCERN.
Delaware Coastal Zone Management Program, Dover.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-263 241, Price codes: A02 in paper copy, A01 in microfiche. Working Paper No. 3, Public Involvement, September 1976. 20 p.

Descriptors: *Baseline studies, *Geographical regions, *Land use, *Coasts, *Delaware, Water quality, Environmental effects, Groundwater, Habitats, Hazards, Coastal processes, Coastal waters, Coastal zone management, Subsqueous lands, Outer Continental Shelf.

This is the third in a series of working papers which will be issued to interested citizens and governmental officials so that they may actively and effectively participate in the development of Delaware's Coastal Zone Management Program. It deals only with the process of determining areas and describes the significance of those areas considered and the initial planning steps taken which will lead to eventual designation of Geographic Areas of Particular Concern. Subjects treated include: Area of unique, scarce, fragile or vulnerable natural habitat or feature, historic or achaeological significance, or scenic value; areas of high productivity or essential habitat for living resources, or of critical concern for the production

of food; areas of substantial urban use, recreation or economic value, opportunity or concentration; areas subject to significant hazards due to coastal processes, groundwater resources areas; areas of geologic, topographic or morphologic concern for development; and coastal waters and subaqueous lands. (Sinha-OEIS)
W78-03273

ECOSYSTEMS AND RESOURCES OF THE MASSACHUSETTS COAST,
Massachusetts Office Coastal Zone Management, Boston. Inst. for Man and Environment.
C. Carlozzi, K. King, and W. F. Newbold, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 411, Price codes: A05 in paper copy, A01 in microfiche. Prepared for NOAA Office of Coastal Zone Management, Washington, DC. 1975, 78 p.

Descriptors: *Baseline studies, *Ecosystems, *Coasts, *Estuaries, *Resources, Water quality, Geology, Beaches, Dunes, Salt marshes, Sedimentation, Wetlands, Coastal marshes, Tidal marshes, *Massachusetts, Coastal zone management, Coastal resources, Environmental impact, Outer Continental Sheif, Barrier islands, Tidal flats, Salt ponds.

All the natural and many man-made systems making up the Massachusetts coastline, their importance as facets of the environment, and the ways in which they are used and altered by man are discussed. The report was prepared as a guide for all Massachusetts citizens to use in order to better enjoy and understand their unique heritage. The publication has been divided into four main sections. The first two parts present an overview of the natural forces and ecosystems that form the productive basis for coastal resources. The next part describes man's use of coastal resources and the environmental consequences of man's activities. Finally the report analyzes important broad coastal ecosystems and their resource wealth, complexity, and environmental health. This last section considers needs for future scientific research and information tied to the management of Massachusetts' wealth of coastal resources. (Sinha-OEIS)
W78-03274

APPLICATION OF ESTIMATION THEORY TO DESIGN OF SAMPLING PROGRAMS FOR VERIFICATION OF COASTAL DISPERSION PREDICTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-03275

SPORT FISHING IN WESTERN DELAWARE BAY: ASSESSMENT OF CRITICAL AREAS (RESEARCH ON THE EFFECTS OF CRUDE OIL TRANSFER AND UPSTREAM REFINERIES ON DELAWARE BAY),
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5C.
W78-03277

NUMERICAL MODELING OF DISPERSION IN STRATIFIED WATERS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 5B.
W78-03278

KINEMATICS OF BREAKING WAVES IN THE SURF ZONE: EMPHASIZING ANALYSIS OF IDENTIFIED AND CLASSIFIED BREAKERS,
Naval Postgraduate School, Monterey, CA.
For primary bibliographic entry see Field 8B.
W78-03279

A SUMMARY OF THE TEST PROCEDURES AND OPERATIONAL DETAILS OF A DELAWARE RIVER AND AN OCEAN DUMPING POLLUTION MONITORING EXPERIMENT CONDUCTED AUGUST 28, 1975,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-03280

A PRELIMINARY TEST OF A GOVERNMENT-OWNED LOCAL AREA OIL ON WATER SURVEILLANCE SYSTEM,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5A.
W78-03281

ULTIMATE DISPOSAL OF OIL AND HAZARDOUS MATERIALS,
Coast Guard Office of Research and Development, Groton, CT.
For primary bibliographic entry see Field 5E.
W78-03283

UNIQUE ECOLOGICAL FEATURES OF THE LOUISIANA COAST.
Burk and Associates, Inc., New Orleans, LA.
For primary bibliographic entry see Field 6G.
W78-03284

DETERMINATION OF THE ATMOSPHERIC CONTRIBUTION OF PETROLEUM HYDROCARBONS TO THE OCEANS,
World Meteorological Organization, Geneva, (Switzerland).
For primary bibliographic entry see Field 5B.
W78-03285

THE PHYSICAL OCEANOGRAPHY AND WATER QUALITY OF NEW YORK HARBOR AND WESTERN LONG ISLAND SOUND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-03286

IMPACTS OF OUTER CONTINENTAL SHELF ACTIVITIES: LAFOURCHE PARISH, LA,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W78-03288

BARATARIA BASIN: BIOLOGICAL CHARACTERIZATION,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W78-03289

SHORE AND BEACH MANAGEMENT IN LOUISIANA,
Louisiana Coastal Commission, Layfayette.
V. Behrhorst.
Shore and Beach, Vol 44, No 1, p 3-5, April 1976.

Descriptors: *Louisiana, *Beach erosion, *Mississippi River, *Shore protection, *Land management, Permits, Legal aspects, State governments, Coastal marshes, Coasts, Land use, Shores, Coastal plains, Legislation, Gulf of Mexico, State jurisdiction, Deltas, Alluvium, Erosion, Water law, Tidal marshes.

Due to active delta-building processes, the Louisiana coastal region consists of an irregular shoreline with few sandy beaches. Erosion, primarily caused by poor Gulf currents, has been a serious problem for those few existing beaches. The poor shoreline and hurricane threats have hampered growth along the coast. Only two recreational areas have been developed on the shore. The few settlements on the coast have resulted from offshore oil drilling companies establishing makeshift towns. The author in large part blames Louisiana state government for the poor coastal conditions. Although federal money and Army Corps of Engineers expertise was available, the state's failure to produce a comprehensive beach and shore management program made it ineligible for federal help. The author urges the state to integrate a shore and beach management plan into the larger coastal zone plan. Otherwise both growth and preservation of the state's shorelines cannot be accomplished. (Cocheu-Florida)
W78-03341

NORTH CAROLINA COASTAL ZONE MANAGEMENT ACT,
North Carolina State Dept. of Administration, Raleigh. Office of Marine Affairs.
S. Hecker.
Shore and Beach, Vol 44, No 1, p 7-8, April 1976.

Descriptors: *North Carolina, *Land management, *Coasts, *Regulation, *State government, Coastal plains, Legislation, Legal aspects, Scenery, Preservation, Aesthetics, Economics, Land use, Local governments, Project planning, Environmental effects, Land development, State jurisdiction, Atlantic Ocean, Protection.

The 1974 North Carolina Coastal Area Management Act was enacted because of the danger that uncontrolled pressures would destroy the state's coastal regions. The Act established a comprehensive state and local coastal planning program under the Coastal Resources Commission to preserve and manage existing resources, plan careful development, and provide standards for protection of the coastal area. The state hoped to foster orderly conservation and development through a program of land and water use planning. Local governments were given the primary responsibility for planning in their regions. The state publicized the program to initiate public participation in local planning. Serving as an overseer-coordinator, the state gathered technical data from the localities and made certain the localities complied with the Act. Problems were encountered with the Act. Public acceptance was not overwhelming because many factions in the state believed the law hindered development. There has also been difficulty defining the areas of environmental concern. However, the program is expected to have far-reaching effects on both the aesthetics of the coastal area and the economy. Therefore, the Coastal Resources Commission is determined to do a proper job. (Cocheu-Florida)
W78-03342

THE URBAN WATERFRONT: OPPORTUNITIES FOR RENEWAL,
New York Univ., NY. Graduate School of Public Administration.
M. L. Moss.
National Civic Review, Vol 65, p 241-44, May, 1976.

Descriptors: *Coastal engineering, *Urban renewal, *Coastal structures, *Area redevelopment, *Community development, City planning, Urbanization, Urban mapping, Navigable waters, Harbors, Land use, Cities, Canneries, Seashores, Coasts, Recreation, Industries, Shores, Piers, Docks, Railroads.

There is now a nationwide trend to convert urban waterfront areas from port uses to large-scale, multi-purpose complexes which can be used for both residential and commercial activity. This growing trend is caused by the decline of urban port areas resulting in wasted space and urban blight. Deterioration of urban ports can be blamed

on several factors including developments in surface transportation which have led to a decline in the amount of cargo shipped by railroads and the change in the pattern of passenger transportation from ocean liner to airplanes. Redevelopment of declining ports is a new aspect of coastal zone management programs. In the past, management programs were only concerned with the protection of undeveloped coastal areas. Now the redevelopment of urban waterfront renewal may be aimed at a variety of objectives including new residential housing, commercial shopping districts, or recreational facilities. Modern construction technologies make it possible to extend the city's boundaries through landfill, piles, and over-water decks. Waterfront renewal also provides stimulation of the urban economy. (Quarles-Florida)
W78-03344

ISSUES INVOLVED IN UNITED STATES BEACH PRESERVATION AND PROTECTION PROGRAMS,
Cook Coll., New Brunswick, NJ.
J. K. Mitchell.
Shore and Beach, Vol. 43, No. 1, p 27-29, April 1975.

Descriptors: *Coastal engineering, *Structural engineering, *Beach erosion, *Shore protection, *Land management, Erosion, Environmental engineering, Sea walls, Coasts, Land tenure, Legal aspects, Land use, Legislation, Coastal structures, Shores, Environmental effects, Financing, Beaches, Geology, Ecosystems, Dune sands, Federal jurisdiction, Preservation.

In the past, structural engineering was the primary federal solution to beach erosion. Recent booming coastal development has vastly accelerated loss of sandy beaches. Over 70% of the land fronting the nation's shore is privately owned. Since federal funds cannot be spent to protect private property unless some significant public benefit exists, beach erosion is a problem in desperate need of new solutions. Private property owners want federal funding but are unwilling to increase public access to beaches they feel are theirs. Localities, often hard pressed to pay for expensive engineering, alternatively do not want to save the shores for a few landowners or open up the beaches to many non-resident users. To combat the fiscal squeeze and the reluctance of private owners to grant access to the shore, the author suggests new management techniques for beach protection. State and local coastal management and zoning as envisioned in the Coastal Zone Management Act of 1972 is a beginning. However, local regions must adopt programs balancing public and private interests to provide access and control growth. Federal financing can then be utilized to rebuild beach damage, both natural and man-made. (Cocheu-Florida)
W78-03348

NORTHERN ST. JOHNS COUNTY COASTAL MANAGEMENT PLAN,
Florida Coastal Engineers, Inc., Jacksonville.
For primary bibliographic entry see Field 6F.
W78-03349

THE FIGHT TO SAVE HAWAII'S SHORELINES,
D. Meller.
Shore and Beach, Vol. 45, No. 1, p. 12-16, January 1977.

Descriptors: *Hawaii, *Public access, *Shore protection, *Legislation, *Beaches, Zoning, Recreation, Coastal structures, Legal aspects, Real property, Right-of-way, Banks, Fishing, Shores, Water rights, Coastal engineering, Boundaries(Property), Oceans, Access routes, Non-consumptive use, Recreation facilities.

The rapid development of Hawaii's shorelines has stimulated citizens' groups to lobby for public policies which would preserve the appearance and recreational value of these shorelines. They desire a strong state coastal zone management program to replace the present interim shoreline protection law. The authors believe the existing Act is likely to prevent unpopular shoreline development although its effectiveness has not yet been tested. The availability of shoreline land for public recreational purposes will require state acquisition of access, use and title to the shoreline. An effective state coastal zone management program should incorporate the following elements: (1) 'down zoning' of the shoreline with restrictions on county authority to allow shoreline development; (2) a provision that no permits be granted by public agencies unless land is dedicated for shoreline access and greenbelts; and (3) earmarking of funds for acquisition of shoreland by the state. (Maass-Florida)
W78-03354

ACCURATE CALCULATION OF TRANSPORT IN TWO DIMENSIONS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 5B.
W78-03463

ON THE STABILITY OF THE CALIFORNIA UNDERCURRENT OFF VANCOUVER ISLAND,
National Center for Atmospheric Research, Boulder, CO.
L. A. Mysak.
Journal of Physical Oceanography, Vol. 7, No. 6, p 904-917, November 1977. 11 fig, 3 tab, 24 ref.

Descriptors: *Ocean currents, *Currents(Water), *Pacific Ocean, *Model studies, Mathematical models, Circulation, Water circulation, Stability, Upwelling, Coasts, Continental slope, Temperature, Water temperature, Remote sensing, Oceanography, *California Undercurrent, *Vancouver Island.

Recent satellite infrared imagery and hydrographic maps of the sea surface temperature of the northeast Pacific revealed a fairly regular pattern of cells or eddies that are aligned north-south about 150 km west of Vancouver Island. The wavelength of the pattern lies in the range 80-100 km. Current observations taken near the edge of the continental shelf at a depth of 200 m off Tofino, Vancouver Island, showed oscillations with periods of days to about 2 weeks. At intermediate depth off the coast of Vancouver Island and northern Washington, recently derived geostrophic flow patterns showed a northward current along the continental slope (the California Undercurrent). The stability of a two-layer model of the California Undercurrent off Vancouver Island and northern Washington was considered in an attempt to explain the source of the observed spatial and temporal variations. The model flow is baroclinically unstable, with the amplifying wave disturbances propagating northward along the continental slope. For typical vertical shears associated with the California Undercurrent, the most unstable waves have wavelengths and periods in the ranges 65-94 km and 5-10 days, respectively, in good agreement with the observed fluctuations. (Sims-ISWS)
W78-03465

DISPERSION OF A PASSIVE CONTAMINANT IN OSCILLATORY FLUID FLOWS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W78-03466

OBSERVATION OF A BATHYMETRICALLY TRAPPED CURRENT RING,
Washington Univ., Seattle. Dept. of Oceanography.
T. H. Kinder, and L. K. Coachman.
Journal of Physical Oceanography, Vol. 7, No. 6, p 946-952, November 1977. 8 fig, 1 tab, 13 ref. NSF GA11147.

Descriptors: *Ocean currents, *Salinity, *Bathymetry, Circulation, Ocean circulation, Currents(Water), Water circulation, Temperature, Water temperature, On-site investigations, Oceanography, *Bering Sea, Current rings.

Examination of hydrographic data obtained over a large submarine canyon revealed a cell with a core of high salinity water nestled in the outer (deeper) reaches of the canyon. Because of the T-S distribution within the cell and the current that parallels the continental slope adjacent to the canyon, it was suggested that the cell is similar to the current rings which have been observed elsewhere. (Sims-ISWS)
W78-03467

IRRADIANCE MEASUREMENTS IN THE UPPER OCEAN,
Oregon State Univ., Corvallis. School of Oceanography.
C. A. Paulson, and J. J. Simpson.
Journal of Physical Oceanography, Vol. 7, No. 6, p 952-956, November 1977. 4 fig, 2 tab, 9 ref. ONR N00014-76-C-0067.

Descriptors: *Solar radiation, *Light penetration, *Oceans, *Pacific Ocean, On-site investigations, On-site data collections, Oceans, Light, Irradiation, Measurement, Depth, Secchi disks, Optical properties, Turbidity, Data processing, Regression analysis, Oceanography.

Observations were made of downward solar radiation as a function of depth during an experiment in the North Pacific (35 deg N, 155 deg W). The irradiance meter employed was sensitive to solar radiation of wavelength 400-1000 nm arriving from above at a horizontal surface. Because of selective absorption of the short and long wavelengths, the irradiance decreases much faster than exponential in the upper few meters, falling to one-third of the incident value between 2 and 3 m depth. Below 10 m the decrease was exponential at a rate characteristic of moderately clear water of Type IA. Neglecting one case having low sun altitude, the observations are well represented by an equation. The depth at which the irradiance falls to 10% of its surface value is nearly the same as observations of Secchi depth when cases with high wind speed or low solar altitude are neglected. Parameters were computed for the entire range of oceanic water types. (Sims-ISWS)
W78-03468

TIDAL CHARTS OF THE INDIAN OCEAN NORTH OF 15 DEG SOUTH,
Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
C. McCammon, and C. Wunsch.
Journal of Geophysical Research, Vol. 82, No. 37, p 5993-5998, December 20, 1977. 6 fig, 2 tab, 14 ref. NSF OCE72-01384, ONR N00014-75-C-0219.

Descriptors: *Tides, *Charts, *Indian Ocean, Mapping, Maps, Gaging stations, Water levels, Water level fluctuations, Oceans, Sea level, Oceanography, *Tidal charts.

New tidal charts of the northern Indian Ocean were constructed by empirical means from existing data and from recent deep pressure gage measurements. A brief comparison was made to Dietrich's charts (published in 1944) and to some existing numerical models of the region. The deviations from Dietrich's charts are significant but not drastic. (Sims-ISWS)
W78-03469

OBJECTIVE ANALYSIS AND CLASSIFICATION OF OCEANOGRAPHIC DATA,
National Oceanic and Atmospheric Administration, Washington, DC. Center for Experiment Design and Data Analysis.
J. B. Jalickee, and D. R. Hamilton.
Tellus, Vol. 29, No. 6, p 545-560, December 1977. 10 fig, 7 ref.

Descriptors: *Data processing, *Analytical techniques, *Oceanography, Model studies, Mathematical models, Temperature, Water temperature, Salinity, Depth, Profiles, Oceans, Classification, *Data collections, *Oceanographic data.

A new approach to the analysis and classification of oceanographic data is presented. The technique is an empirical one, based on the singular decomposition theorem, for characterizing temperature-salinity-depth profiles as in water-mass analysis. Complementary to the profiles are station or cast-dependent coefficients, which show similarities and differences according to the space-time distributions of the individual stations in the data set. These coefficients were used for classifying the individual stations into groups having similar profiles. Results of applying the new method to a set of data from ocean stations off the coast of Oregon were given. (Sims-ISWS)
W78-03470

VEGETATION ESTABLISHMENT AND SHORELINE STABILIZATION: GALVESTON BAY, TEXAS,
Texas A and M Univ., College Station. Dept. of Range Science.
J. W. Webb, and J. D. Dodd.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 169, Price codes: A05 in paper copy, A01 in microfiche. Coastal Engineering Research Center, Technical Paper No. 76-13, August 1976. 74 p, 29 fig, 32 tab, 25 ref. CERC DACW72-74-C-0002.

Descriptors: *Shore protection, *Vegetation establishment, *Erosion control, *Texas, Vegetation, Erosion, Marsh plants, Coastal marshes, Shoreline cover, Salinity, Salt tolerance, Saline soils, Waves(Water), Bays, Estuaries, *Galveston Bay(Tex), Wave stilling.

Adaptation of species for shoreline stabilization, use of wave-stilling devices, and effects of fertilizers were studied along the north shore of East Bay in Texas. Water salinity varied with rainfall and evaporation throughout the study but never exceeded 18,500 parts per million. Soil texture was classified as a loam or clay-loam. Soil pH, salinity, and cation concentrations fluctuated with bay water salinity, rainfall, evaporation, and location in relation to tidal zones. Giant reed and gulf cordgrass were best adapted for dry areas. Smooth cordgrass was the species best adapted in areas exposed to tidal action. The survival and growth of this species appeared essential in stabilizing the eroding upper Texas coast bay shoreline. Wave-stilling devices of hay bales were not able to withstand highwave energy. Tires on cables attached to posts lost their effectiveness as they sank into the mud. Nevertheless, smooth cordgrass survival was significantly greater behind these devices. Mechanical planting behind a tractor was accomplished at low tides. Nitrogen and phosphorus fertilizers did not significantly improve survival or reproduction in transplanted areas, but they were significant in natural smooth cordgrass stands for reproduction and herbage production. (See also W76-07567) (Sims-ISWS)
W78-03475

SIXTH SEMIANNUAL INTERAGENCY BRIEFING FEBRUARY 1976, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5G.
W78-03477

NUMERICAL MODEL RESULTS OF DREDGED MATERIAL DISPOSAL AT TEN PROPOSED OCEAN DISPOSAL SITES IN THE HAWAIIAN ISLANDS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics Lab.
For primary bibliographic entry see Field 5B.
W78-03483

SHOALING CHARACTERISTICS OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
J. M. Atturio, D. R. Basco, and W. P. James.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 101, Price codes: A06 in paper copy, A01 in microfiche. CDS Report No. 187, TAMU-SG-76-207, May 1976. 112 p, 9 fig, 10 tab, 33 ref, 8 append.

Descriptors: *Channels, *Shoals, *Texas, Sediment transport, Sedimentation, Dredging, Coasts, Hydrology, Model studies, Inland waterways, Gulfs, Analysis, *Texas Gulf Intracoastal Waterway, *Intracoastal waterways, Shoaling rate.

Maintenance dredging records were used to compute average shoaling rates in 5000-ft reaches for the entire Texas Gulf Intracoastal Waterway. Environmental data pertinent to the waterway were gathered from published and unpublished sources. Computed shoaling rates and selected environmental features were plotted on Composite Factors Maps. Similar reaches were grouped and examined using analysis of variance techniques to determine the effect of selected environmental factors on shoaling rates. A model also was developed to predict shoaling rate in a reach with known environmental factors. The average shoaling rate over the entire waterway was found to be 10.5 in per year. Shoaling in open bay areas was found to be an average of 3 in per year greater than in land-cut areas. The combination of dredged material mounds, or fetch greater than 5 mi, with water depths less than 6 ft (surrounding bay depth) increased average shoaling rates 5 in per year. The placement of dredged material in mounds on the windward side of the waterway increased the average shoaling rate of open bay areas by 7 in per year. In bay areas with long fetches and depths less than three ft, it was found that windward placement of dredged material was actually advantageous. Hurricanes did not appear to have a drastic impact on shoaling rates; however, localized effects were noted in several areas. (Lee-ISWS)
W78-03485

HYDRAULICS AND DYNAMICS OF NORTH INLET, SOUTH CAROLINA, 1974-75,
South Carolina Univ., Columbia. Dept. of Geology.
R. J. Finley.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 419, Price codes: A09 in paper copy, A01 in microfiche. GITI Report No. 10, September 1976. 188 p, 57 fig, 17 tab, 76 ref, 4 append.

Descriptors: *Waves(Water), *South Carolina, *Inlets(Waterways), Tides, Hydraulics, Winds, Beaches, Beach erosion, Hydrography, Sedimentation, Seasonal, *Inlet morphology, Tidal hydraulics, Manning's n friction coefficients, Keulegan Repletion Coefficients.

Detailed quarterly studies at North Inlet, South Carolina, showed variations in wave parameters, beach and inlet morphology, and tidal hydraulics. The variations are related to seasonal climatic patterns. Wind magnitude and direction, occurrence of northeast storms, and brackish water influx from adjacent Winyah Bay are significant process variables. Over 800 unique visual wave observations indicated that annual resultant wave energy flux is directed to the south. However, an energy flux reversal due to ebb tidal delta morphology results in longshore transport of sediment toward the inlet, adding to swash bars, the channel-margin linear bars, and a northward recurving spit. An estimate of the volume of inlet-directed longshore sediment transport (350,000 cubic meters per year), based on observed energy fluxes, gave a value which is 83% of the annual longshore transport rate (430,000 cubic meters per year), based on 39 years of spit and shoal growth. Beach profiles at 11 locations showed that erosion is primarily due to northeast storms and that the shoreline is transgressive. A maximum of 7 m of foredune retreat was observed during the winter of 1972-73. The foredune retreat contributes abundant sediment to the ebb tidal delta, which has a present volume of over 35,700,000 cubic meters. (Lee-ISWS)
W78-03489

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W78-03564

PLANKTON INVESTIGATIONS IN ISHIKARI BAY, HOKKAIDO, ZOOPLANKTON BIOMASS DURING THE SUMMER AND AUTUMN OF 1975, (IN JAPANESE),
M. Kotori.
Sci Rep Hokkaido Fish Exp Stn 19, p 1-11, 1977.

Descriptors: *Zooplankton, *Distribution, Seasonal, Sampling, *Biomass, *Chaetognatha, *Copepod, *Japan(Ishikari Bay).

Information of the biomass of zooplankton (macroplankton) in Ishikari Bay (Japan) is Aug.-Sep. and Oct., 1975 is given. Zooplankton were collected with a North Pacific standard net (NORPAC net) at 56 stations distributed over Ishikari Bay from Aug. 26th-Oct. 20th in 1975. In addition, MORPAC net samples obtained at 3 stations on Oct. 17th, 1974, were also examined. The samples were obtained by vertical hauls from the near sea bottom to the surface of from a depth of 150 m to the surface when the bottom was deeper than 150 m. The areal distribution of zooplankton biomass indicated that the biomass increased in seaward in the bay, and that only a few zooplankton (< 0.1 g wet wt/m2 per 0-20 m) lived in the Ishikari River estuary. The zooplankton biomass was estimated to be 0.5-0.7 g wet weight/m2 per 0-20 m in Ishikari Bay in Aug.-Sept. and Oct. On the basis of vertical hauls with the standard net at 3 stations Oct. 17th, 1974, it is evident that the biomass of copepods was approximately 40% of the total mass of zooplankton, and the chaetognaths comprised about 30% of the total zooplankton weight. Ishikari Bay in Oct. is characterized by warm temperate waters.--Copyright 1978, Biological Abstracts, Inc.
W78-03595

SALT-MARSH PLANT GERATOLOGY,
Georgia Univ., Brunswick. Marine Extension Service.
M. A. Hardisky, and R. J. Reimold.
Science, Vol 198, No 4317, p 612-614, 11 November 1977. 1 fig, 2 tab, 6 ref.

Descriptors: *Primary productivity, *Salt marshes, *Plant growth, Plant ecology, Maine, Delaware, Georgia, Wetlands, Spartina spp.

Culm elongation and leaf production, senescence, and abscission were measured on individual culms of salt-marsh hydrophytes. Continual addition of plant material by individual culms indicates an independence of annual primary productivity from peak standing crop biomass. Lead residence time, continual culm mortality, and pulses of detritus

export constitute essential processes controlling primary productivity and ultimately determine the value of a plant species to the estuarine wetland ecosystem. (Stihler-Mass)
W78-03654

THE PHYTOSOCIOLOGY OF THE GREEN SWAMP, NORTH CAROLINA,
Bureau of Sport Fisheries and Wildlife Research Center, Jamestown, ND.
For primary bibliographic entry see Field 2H.
W78-03655

MARSH MANAGEMENT FOR WILDLIFE: A BIBLIOGRAPHY WITH ABSTRACTS,
Louisiana Cooperative Wildlife Research Unit, Baton Rouge.
M. L. Spohrer.
Special Publication No 1, December 1975. 55 p, 167 ref.

Descriptors: *Bibliographies, *Wildlife management, *Freshwater marshes, *Coastal marshes, Waterfowl, Furbearers, *Louisiana, Wetlands.

Included are wildlife management studies that have been done in marsh ecotypes similar to those found in the Louisiana coastal marshes and techniques adaptable to Louisiana. Emphasis is on freshwater marshes. The 167 entries are divided into two groups: (1) General marsh management including water-level manipulation, salinity control, grazing regulations for cattle, plowing and planting, burning, creating mechanical openings, and chemical control of undesirable marsh plants, and (2) Species management subdivided into waterfowl and shorebirds, furbearers, and other wildlife. (Stihler-Mass)
W78-03656

WATER BIRDS AND THEIR WETLAND RESOURCES IN RELATION TO OIL DEVELOPMENT AT STORKERSEN POINT, ALASKA,
Iowa State Univ., Ames. Dept. of Animal Ecology.
For primary bibliographic entry see Field 5C.
W78-03657

ENERGY VALUE, ELEMENTAL COMPOSITION, AND PRODUCTIVITY OF BELOW-GROUND BIOMASS OF A JUNCUS TIDAL MARSH,
Mississippi State Univ., Mississippi State. Dept. of Zoology.
A. A. De La Cruz, and C. T. Hackney.
Ecology, Vol 58, No 5, p 1165-1170, Late Summer 1977. 2 fig, 1 tab, 19 ref.

Descriptors: *Estuarine environment, *Root development, *Standing crops, *Cycling nutrients, *Tidal marshes, *Primary productivity, *Wetlands, Annual turnover, Biomass, Plant growth, Energy, Root systems, Root zones, Gulf of Coastal Plain, *Mississippi, Rhizones, Coastal marshes, *Needlerush, *Root productivity, *Estuarine energetics, Energy values, St Louis Bay(Miss).

Belowground standing crop of a Juncus roemerianus marsh in Mississippi ranged from 9.7 to 12.4 kg dry wt/sq m with the peak biomass occurring in April. Annual productivity estimated from expected maximum minus expected minimum biomass fitted into a periodic regression model was 1.36 kg/sq m. Ninety-four percent of the productivity was within the top 20 cm indicating that the bulk of the materials found beyond this depth consisted of dead tissues. Energy, carbon, hydrogen, nitrogen, and phosphorus contents of belowground materials did not vary significantly during the year, but patterns of differences in samples taken from different depths were evident. The productivity of belowground materials in Juncus marshes is comparable with aboveground productions reported in the literature with respect to dry biomass. The probability that large portions of the underground production enter the aqueous system and become incorporated in estuarine energetics merits further consideration. (Steiner-Mass)
W78-03659

COASTAL RECREATION RESOURCES IN AN URBANIZING ENVIRONMENT, SYMPOSIUM, HYANNIS, MASSACHUSETTS, APRIL 12-14, 1976.
For primary bibliographic entry see Field 6B.
W78-03662

MACROZOOBENTHOS OF SALT WATER BODIES OF THE SOUTH PRIMOR'YE (THE SEA OF JAPAN), (IN RUSSIAN),
Far Eastern Univ., Vladivostok (USSR).
G. N. Volova.
Gidrobiol Zh. 10(6), p 32-37, 1974.

Descriptors: *Distribution, Sea water, Brackish water, Salinity, *Sea of Japan, Lakes, Saline lakes, *Benthos, *USSR(Lake Talmi).

The regularity in distribution of various groups of benthic organisms in the water bodies under study was determined. In water bodies connected with the sea (with great fluctuation of water salinity) the fauna consists of marine brackish-water and freshwater forms; in the water bodies isolated to some extent from the sea (with constant low salinity) it consists of freshwater and brackish-water forms. In the Lake Talmi (USSR) (Salinity 9.7-21.6%) the fauna is represented by marine and brackish-water species.--Copyright 1975, Biological Abstracts, Inc.
W78-03681

ROTARY CROSS-BISPECTRA AND ENERGY TRANSFER FUNCTIONS BETWEEN NON-GAUSSIAN VECTOR PROCESSES. II. WINDS AND CURRENTS OFF THE OREGON COAST,
Oregon State Univ., Corvallis. School of Oceanography.
N-C. Yao, S. Neshyba, and H. Crew.
Journal of Physical Oceanography, Vol. 7, No. 6, p 892-903, November 1977. 8 fig, 2 tab, 7 ref. ONR N00014-68-0148, NSF GA23015, GA1589.

Descriptors: *Ocean currents, *Winds, *Coasts, *Oregon, *Pacific Ocean, Currents(Water), Model studies, Mathematical models, On-site investigations, On-site data collections, Data processing, Current meters, Wind pressure, Energy transfer, Oceanography, Rotary bispectra, Cross-bispectra.

Application of rotary cross-bispectra and energy transfer functions to a set of wind and current data measured from the Totem research buoy showed these elements to be non-Gaussian and that nonlinear interactions do occur between the wind stress and current at 14 m depth. Such transfers account for 35% of the total energy estimates and for 100% of the estimates at the inertial frequency. For the latter, the most effective set of nonlinear interacting components include half-day and quarter-day components of wind stress. No energy transfers linearly. The effect of nonlinear interaction in broadening the current response spectrum was noted. (See also W75-07911) (Sims-ISWS)
W78-03688

A LEGAL ORDER FOR THE OCEANS, II,
For primary bibliographic entry see Field 6E.
W78-03691

BASELINE STUDY PROGRAM, NORTH PUGET SOUND BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL. II BIBLIOGRAPHY,
Beak Consultants Inc., Portland, OR.
For primary bibliographic entry see Field 5B.
W78-03698

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DEATH OF THE SWEET WATERS,
For primary bibliographic entry see Field 5G.
W78-03326

REVERSE OSMOSIS MEMBRANE,
Department of the Interior, Washington, DC. Office of the Secretary.
J. E. Cadotte.
U.S. Patent No. 4,039,440, 6 p, 6 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 254, August 2, 1977.

Descriptors: *Patents, *Desalination, *Water purification, Separation techniques, Membrane processes, *Reverse osmosis, *Membranes.

The efficiency of the reverse osmosis process depends to a large extent on the nature of the membrane. In this invention the reverse osmosis membrane is prepared by reaction of a film or layer of polyethylenimine with a polyfunctional reagent whose functional groups are capable of reacting with amine groups. The polyfunctional reagent is preferably a water-soluble, aromatic or heterocyclic compound having acid chloride or isocyanate functional groups. The membrane is preferably prepared in situ on a polysulfone or chlorinated polyvinyl chloride support by initial formation of a layer of polyethylenimine on the support, followed by interfacial reaction with the polyfunctional reagent to produce a thin surface coating possessing salt barrier characteristics. (Sinha-OEIS)
W78-03606

ION-EXCHANGE PROCESS FOR DESALTING WATER AND SUBSEQUENT REGENERATION OF THE ION EXCHANGERS,
CKD DUKLA, Prague (Czechoslovakia). (Assignee).
V. Kadlec, and P. Huebner.
U.S. Patent No. 4,039,442, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 254, August 2, 1977.

Descriptors: *Patents, *Desalination, *Water treatment, *Water purification, Desalination processes, *Ion exchange, Separation techniques, Desalination apparatus, Regeneration.

Water to be desalted in an ion-exchange process is contacted with a first cation exchanger in the form of a monovalent cation, and a first anion exchanger. The resultant treated solution is then reacted with a second, weakly acidic cation exchanger in the form of a free acid and, in certain applications, with a second weakly basic anion exchanger in the form of a free base to complete the desalting portion of the process. The second ion exchangers are then regenerated with the use of desalted water at a temperature greater than 30 degrees C, and the products of such reaction (including a hydroxide of the monovalent cation) are employed to regenerate one or more of the remaining exhausted ion exchangers. (Sinha-OEIS)
W78-03607

3B. Water Yield Improvement

SNOW ACCUMULATION AND MELT IN SPRAYED AND UNDISTURBED BIG SAGEBRUSH VEGETATION,
Rocky Mountain Forest and Range Experimentation Station, Collins, CO.
For primary bibliographic entry see Field 4C.

W78-03320

THE COMING WATER FAMINE,
House, Washington, DC.
J. Wright.
Coward-McCann, Inc., New York, 1966, 255 p.

Descriptors: *Water shortage, *Water transfer, *Weather modification, *Water pollution, Water conservation, Water purification, Consumptive use, Cloud seeding, Sulfite liquors, Water Quality Act, Watershed Protection and Flood Prevention Act, Water management(Applied), Water distribution(Applied), Water pollution sources, Shellfish, Industrial waste, Thermal pollution, Federal government, Evaporation control, Detergents, Desalinization, Irrigation, Biochemical oxygen demand, Aerobic bacteria.

In the midst of unprecedented plenty, America has been rapidly running out of usable water. In an attempt to analyze the causes of and solutions to the predicted water famine, the author has traced the early beginnings of man's incredible misuse of one of his most abundant resources. He uses an anecdotal style in exploring global use and misuse of water throughout history. Specific scrutiny is given to drought, urbanization, agriculture, pollution, water transfer, weather modification and desalinization. Solutions to the approaching crisis are explored with emphasis on the need for federal leadership in this area through federal water-development programs. State projects such as the Ohio River Valley Water Sanitation Commission are examined. The author concludes that action must be taken immediately if the approaching crisis is to be staved off. He suggests: (1) change in public attitude; (2) greater sense of administrative urgency; (3) tightening of congressional procedures; (4) increased research on desalinization and weather modification; (5) expanded pollution abatement; (6) water transport planning; (7) coordinated water management; and (8) more upstream programs of land treatment and small detention dams in tributaries. (Quarles-Florida)
W78-03324

WATER SAVED OR WATER LOST: THE CONSEQUENCES OF INDIVIDUAL CONSERVATION MEASURES IN THE APPROPRIATION STATES,
W. E. Bergholz, Jr.
Land and Water Law Review, Vol XI, No 2, p 435-57, (1976).

Descriptors: *Water rights, *Appropriation, *Water conservation, *Developed waters, Prior appropriation, Environmental effects, Environmental engineering, Technology, Legal aspects, Legislation, Priorities, Aesthetics, Environment, Water transfer, Water demand, Water distribution(Applied), Water allocation(Policy), Water, Water loss, Water law, Water control, Judicial decisions.

In the appropriation states of the western United States, one who salvaged or developed waters traditionally had a superior right to such water. However, this rule has come under much criticism recently as the demand for previously appropriated waters has increased. This article examines the legal effects of individual water conservation efforts as they relate to users in the western states. The author discusses the legal background for salvaged and developed waters as well as the economic, technical aesthetic, and identification problems involved in this area of law. A major problem is that one who salvages water is then precluded from applying that water to new lands. The efficient use of water requires use of a system which encourages conservation by rewarding those who institute conservation practices with the right to use conserved water and apply it to new lands. The system, however, must be one which provides incentives to conserve and develop water resources without harming other appropriators or destroying the environment. The author proposes rules which he feels will accomplish this balance while providing a workable system. (Josepher-Florida)
W78-03379

THE EFFECT OF IRRIGATION ON PRECIPITATION IN THE GREAT PLAINS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W78-03486

SHORT- AND LONG-TERM EFFECTS OF ANTITRANSPIRANTS ON WATER RELATIONS AND PHOTOSYNTHESIS OF WOODY PLANTS,
Wisconsin Univ.- Madison. Dept. of Forestry.
For primary bibliographic entry see Field 2I.
W78-03642

IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM, TUCSON, ARIZONA, JULY 9, 1977.
For primary bibliographic entry see Field 4C.
W78-03661

3C. Use Of Water Of Impaired Quality

THE RISING COST OF MAKING DESERTS BLOOM,
Earthscan, London (England).
For primary bibliographic entry see Field 4B.
W78-03621

MANAGEMENT MODEL FOR WASTEWATER DISPOSAL ON LAND,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5E.
W78-03636

WATER CONSERVATION AND POLLUTION CONTROL IN COAL CONVERSION PROCESSES,
Water Purification Associates, Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03685

3D. Conservation In Domestic and Municipal Use

FINANCING AND COST SHARING MUNICIPAL WATER SUPPLY SYSTEMS,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 6C.
W78-03419

URBAN STORMWATER MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03632

SELECTION OF MODELS FOR URBAN DRAINAGE PROBLEMS: TECHNICAL ASPECTS AND NON-TECHNICAL CONSTRAINTS,
MacLaren (James F.) Ltd., Willowdale (Ontario). Water Resources Group.
For primary bibliographic entry see Field 4A.
W78-03633

WATER QUALITY ASPECTS OF AGRICULTURAL AND URBAN DRAINAGE,
Rice Univ., Houston, TX.
For primary bibliographic entry see Field 5G.
W78-03638

SIMULATION OF QUALITY OF URBAN DRAINAGE EFFLUENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W78-03641

INCOME AND PRICE ELASTICITIES OF DEMAND FOR WATER IN DEVELOPING COUNTRIES,
Harvard Univ., Cambridge, MA. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 6D.
W78-03645

OWNERSHIP AND WATER SYSTEM OPERATION,
West Virginia Univ., Morgantown. Dept. of Economics.
For primary bibliographic entry see Field 6C.
W78-03647

THE COMPLETE DRAINAGE PROGRAM--MORE THAN AN ORDINANCE,
Hydrocomp, Inc., Atlanta, GA.
For primary bibliographic entry see Field 6E.
W78-03650

WATER CONSUMPTION IN SMALL COMMUNITIES OF NORTHEAST THAILAND,
Asian Inst. of Tech., Bangkok, Thailand.
For primary bibliographic entry see Field 6D.
W78-03651

3E. Conservation In Industry

STARCH RECOVERY EXCEEDS 90% WITH LIQUID CYCLONE SYSTEM.
For primary bibliographic entry see Field 5D.
W78-03202

RECOVERY AND REUSE OF USEFUL MATERIALS FROM POLLUTANTS OF DYESTUFF INDUSTRY,
Arlabs Ltd, Bhatghar (India).
For primary bibliographic entry see Field 5D.
W78-03204

RECOVERY AND REUSE OF MATERIALS FROM DYESTUFF INDUSTRY,
V. J. T. Inst., Bombay (India). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5D.
W78-03205

TEXTILE INDUSTRY EFFLUENTS--INSTRUCTIONS FOR PRACTICAL USE (TEXTIL-ABWASSER--WEGLEITUNG FUER DIE PRAXIS).
For primary bibliographic entry see Field 5G.
W78-03206

CONCENTRATING WOOL CONTAMINANTS.
For primary bibliographic entry see Field 5D.
W78-03208

WATER CONSERVATION IN TEXTILE FINISHING,
Tootal Fabric Div. Research, Cheshire (England).
For primary bibliographic entry see Field 5D.
W78-03211

WATER REUSE IN THE SOUTHWEST,
New Mexico State Univ., University Park.

For primary bibliographic entry see Field 5G.
W78-03219

ORGANIC BIODEGRADATION IN HYPERSALINE WASTEWATER,
For primary bibliographic entry see Field 5C.
W78-03220

LEATHER TANNING AND FINISHING WASTE MANAGEMENT RESEARCH AND DEVELOPMENT PROGRAM,
Industrial Environmental Research Lab.-Cincinnati, Corvallis, OR. Corvallis Field Station.
For primary bibliographic entry see Field 5D.
W78-03225

WASTE RECOVERY: ZINC RECOVERY FROM RAYON PLANT SLUDGE,
Avtex Fibers, Inc., Front Royal, VA.
For primary bibliographic entry see Field 5D.
W78-03295

METHOD FOR TREATING PULPING EFFLUENT, (IN JAPANESE),
For primary bibliographic entry see Field 5D.
W78-03299

NEW REFLECTIONS ON CLOSED CYCLES IN THE PAPER AND BOARD INDUSTRY (REFLECTIONS NOUVELLES SUR LES CYCLES FERMES DANS L'INDUSTRIE DU PAPIER ET DU CARTON),
Sulzer Freres S. A., Winterthur (Switzerland).
For primary bibliographic entry see Field 5D.
W78-03307

NEW ENGLAND TISSUE MILL RECYCLES 73% OF ITS WHITE WATER EFFLUENT,
Marcal Paper Mills, Inc., Elmwood Park, NJ.
For primary bibliographic entry see Field 5D.
W78-03313

ENVIRONMENTAL PROTECTION ENERGY USE IN THE (U.S.) PULP AND PAPER INDUSTRY,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5G.
W78-03318

BLEACH PLANT FILTRATE RECOVERY,
Erco Envirotech Ltd., London (Ontario). (Assignee).
For primary bibliographic entry see Field 5D.
W78-03322

WATER RIGHTS IN THE COAL FIELDS OF THE YELLOWSTONE RIVER BASIN,
Bureau of Indian Affairs, (Washington, DC.).
For primary bibliographic entry see Field 6E.
W78-03359

THE ENVIRONMENTAL EFFECTS OF USING COAL FOR GENERATING ELECTRICITY,
Argonne National Lab., IL.
For primary bibliographic entry see Field 6G.
W78-03455

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE: CHAPTER 5. BASIC PETROCHEMICALS INDUSTRY,
Radian Corp., Austin, TX.
For primary bibliographic entry see Field 5D.
W78-03457

WATER RECLAMATION AND REUSE, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, OH.
For primary bibliographic entry see Field 5D.
W78-03537

MATRIX OF ALGAE AND METHOD OF MAKING SAME AND METHOD OF OBTAINING URANIUM FROM SEA WATER BY SAID MATRIX,
Kernforschungsanlage Juelich G.m.b.H. (West Germany).
E-A. Heide, M. Wald, M. Paschke, and K. Wagener.
U.S. Patent No. 4,039,445, 3 p, 4 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 255, August 2, 1977.

Descriptors: *Patents, *Sea water, Algae, Chlorophyta, Uranium extraction, Mutants.

A method of extracting uranium from sea water consists from sea water consists in passing uranium-containing sea water through a matrix containing single cell green algae cultivated compatible with uranium. The uranium compatible algae mutants are placed in a filter cage in an area of sea in which low and high tides pass streams of sea water through the matrix. The separation of the uranium from the matrix is carried out by means of one of the customary methods such as extraction by tributylphosphate. (Sinha - OEIS)
W78-03610

WATER-ENERGY CONFLICTS IN MONTANA'S YELLOWSTONE RIVER BASIN,
Montana State Dept. of Health and Environmental Sciences, Billings. Bureau of Water Quality.
For primary bibliographic entry see Field 6E.
W78-03649

ASSESSMENT OF WATER RESOURCES FOR NUCLEAR ENERGY CENTERS,
Oak Ridge National Lab., TN.
G. Samuels.
Available from the National Technical Information Service, Springfield, VA 22161 as ORNL-5097, Price codes: A06 in paper copy, A01 in microfiche. Report No. ORNL-5097, UC-80, September 1976. 99 p, 29 fig, 21 tab, 14 ref, 1 append. W-7405-eng-26.

Descriptors: *Assessments, *Water resources, *Nuclear powerplants, *Maps, *Rivers, Water levels, Flow rates, Reservoirs, Sites, Exploration, Water supply, Water utilization, Water demand, Planning, Electric power demand, Forecasting, Nuclear energy, Power capacity.

General screening data of the 48 contiguous states identify large land areas that could potentially contain sites for nuclear centers; the data represent an overview of problems and interactions which might by encountered with the undertaking or more in-depth feasibility and practicality studies. Maps show the rivers with sufficient flows: (1) mean annual flows greater than 3,000 cfs, with the flow rates identified for ranges of 3,000 to 6,000, 6,000 to 12,000, 12,000 to 24,000 and greater than 24,000 cfs; (2) monthly, 20-year low flows greater than 1,500 cfs, with the flow rates identified for ranges of 1,500 to 3,000, 3,000, to 6,000, 6,000 to 12,000, and greater than 12,000 cfs. Criteria relating river flow rates required for various size generating stations, both for sites located on reservoirs and for sites without local storage of cooling water, are discussed; these are used in conjunction with plant water consumption rates to estimate the installed generating capacity that may be located at one site or within a river basin. Projections of future power capacity requirement, future demand for water (both withdrawals and consumption), and regions of expected water shortages are presented. Regional maps of water availablility, based on annual, 20-year low flows are also shown. The feasibility of locating large energy centers in these regions is discussed. The availability of water resources and the projected power capacity density vary widely across the country, necessitating detailed long-range planning to resolve conflicting demands of available water resources. The appendix presents definitions of terminology and conversion factors. (Wares-IPA)
W78-03673

A REVIEW OF TRACE ELEMENT STUDIES RELATED TO COAL COMBUSTION IN THE FOUR CORNERS AREA OF NEW MEXICO,
Los Alamos Scientific Lab., NM.
For primary bibliographic entry see Field 5A.
W78-03674

DEVELOPMENT OF WATER RESOURCES IN APPALACHIA.
Corps of Engineers, Cincinnati, OH.
For primary bibliographic entry see Field 6B.
W78-03675

WATER CONSERVATION AND POLLUTION CONTROL IN COAL CONVERSION PROCESSES,
Water Purification Associates, Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03685

POSSIBILITIES FOR TREATING WASTEWATERS GENERATED IN ELECTROPLATING SHOPS TO AVOID SPECIAL WASTES--METAL RECOVERY IN PLACE OF SLUDGE DISPOSAL. PART III (MOEGLICHKEITEN ZUR BEHANDLUNG GALVANISCHER ABWAESSER UNTER VERMEIDUNG VON SONDERABFAELLEN--METALLRUECKGEWINNUNG STATT SCHLAMMDEPONIE. TEIL III),
For primary bibliographic entry see Field 5D.
W78-03689

3F. Conservation In Agriculture

WATER REUSE IN THE SOUTHWEST,
New Mexico State Univ., University Park.
For primary bibliographic entry see Field 5G.
W78-03219

EVAPOTRANSPIRATION FROM A SATSUMA MANDARIN ORCHARD DETERMINED BY ENERGY BALANCE METHOD, (IN JAPANESE),
Ministry of Agriculture and Forestry, Hiroshima (Japan). Fruit Tree Research Station.
For primary bibliographic entry see Field 2D.
W78-03262

SOME REASONS FOR DEVELOPMENT OF IRRIGATION EROSION, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
For primary bibliographic entry see Field 2J.
W78-03329

UPPER MISSOURI REGION, FISCAL YEAR 1974.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 6E.
W78-03360

THE EFFECT OF IRRIGATION ON PRECIPITATION IN THE GREAT PLAINS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W78-03486

METHOD OF SUPPLEMENTAL IRRIGATION FOR FARMING,
H. A. King.
U.S. Patent No. 4,037,787, 5 p, 5 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 960, No 4, p 1624, July 26, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation efficiency, Water delivery(Applied), Fog, Mist, Humidity, Supplemental irrigation.

A method of supplemental irrigation of substantial areas for supplying water to plants and for conserving water already in the plants and in the soil, places in the atmosphere over the area a fog of water particles. The system presents a technique for distributing water over substantial areas - typically 40 to 160 acres - from one to nine central distributing points. It is based on the fact that as water droplets get smaller they will stay in the air for longer and longer periods of time and if given motion can travel for quite long distances before coming to earth. If the production of these fine droplets is combined with a method of moving and directing them - such as with a movable fan, blower, or nozzle - the water can be transported for hundreds of feet before reaching earth as liquid water or as an increased humidity. The majority of the droplets will have a diameter between about 10 and about 200 microns, the mass median diameter being about 50 micros. (Sinha-OEIS)
W78-03597

IRRIGATION PIPE JOINT LOCK,
L. W. Clements.
U.S. Patent No. 4,037,859, 3 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 960, No 4, p 1648, July 26, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Irrigation efficiency, Application equipment, Pipe, Pipe joint lock.

A U-lock has a pair of hinged channel-like arms with flared free ends and a U-shaped spring strap handle connected to the arms and adapted to push them onto and hold them in clamping positions on flanges of irrigation pipe sections. (Sinha-OEIS)
W78-03599

METHOD FOR REDUCING WATER LOSS THROUGH SOIL BY SEEPAGE,
Flintkote Co., Stamford, CT. (Assignee).
For primary bibliographic entry see Field 2G.
W78-03615

AGRICULTURAL BENEFIT ASSESSMENT FROM FLOOD CONTROL,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 6F.
W78-03634

MICRO-CLIMATE CONTROL OF DECIDUOUS FRUIT PRODUCTION WITH OVERHEAD SPRINKLERS,
Utah State Univ., Logan.
R. E. Griffin.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 278-297, 1976. 10 fig, 3 tab, 12 ref.

Descriptors: *Irrigation practices, *Sprinkler irrigation, *Computer models, Fruit crops, Deciduous trees, Temperature, Orchards, Spring, Winter, Utah, *Evaporative cooling, *Overtree sprinkling, *Fruit trees, Bud delay, Water application.

Reported is the use of overhead sprinklers to delay fruit bud development and reduce early spring freeze damage to fruit trees. Overtree sprinkling to provide evaporative cooling has been found to effectively prevent over 80% of early spring freezes. To obtain maximum delay for maximum protection, sprinkling must be initiated as soon as winter rest has been completed; a computer model has been developed which will predict in advance of this date. Savings in water can be realized by following various operating procedures. Sprinkling for blossom delay can be combined with sprinkling for freeze protection. The former can be used in the early spring and the latter in late spring as a means of good protection and water saving. (Bell-Cornell)
W78-03635

ECONOMIC ANALYSIS OF WATER-SAVING TECHNIQUES IN IRAN,
Florida Univ. Gainesville. Dept. of Food and Resource Economics.
G. R. Soltani.
Water Resources Bulletin, Vol. 12, No. 6, p 137-142, December 1976. 4 ref.

Descriptors: *Irrigation efficiency, *Water supply, *Budgeting, *Marginal productivity, Economic feasibility, Field crops, Cost comparisons, Farms, Effects, Investment, *Water-saving technology, *Iran, Net return.

The possibility of increasing the water supply for irrigation through adoption of more efficient water-application techniques as an alternative to new irrigation projects was studied in an irrigated region of Iran. Excessive water application at the farm level ranks high among the causes of water shortages in the selected region. An empirical analysis of the effect of water-saving technology on the farm operator's net return was made choosing two farms in the region as a case study. The problems facing these farms are common to most farms throughout the country. The results of the budgeting analysis of the selected farms indicated that an improvement in irrigation technique can result in the expansion of water supply and in a higher marginal value product for water. Comparing the costs of irrigation systems with the net return resulting from the higher efficiency showed that such an investment is economically feasible. (Bell-Cornell)
W78-03644

ECONOMIC FEASIBILITY OF IRRIGATING SOUTHERN PINES,
Wisconsin Univ.-Parkside, Kenosha. Div. of Social Sciences.
C. Manogaran.
Water Resources Research, Vol. 9, No. 6, p 1485-1496, December 1973. 3 fig, 5 tab, 19 ref, append.

Descriptors: *Economic feasibility, *Irrigation, Soil moisture, *Loblolly pine trees, *Forests, Forestry, Regional analysis, Benefits, Costs, Data collections, Climatic data, Operating costs, Water supply, Southeast U.S., Texas, Mathematical models, Systems analysis, Forecasting, *Estimating, Atlantic coast.

A climatic model developed for estimating the depressing effect of drought on the diameter growth of loblolly pines in the southern United States is used to project potential pine growth under conditions of no soil moisture deficit, which irrigation could assure. The regional distribution of the additional growth demonstrates that the benefits of irrigation would increase from the Atlantic coast toward east Texas. The dollar value of the additional growth based on the current price of pulpwood is compared with the costs necessary to irrigate southern pines. Under present conditions of technology, costs of irrigation would exceed benefits. Technological changes, higher pulpwood prices, or decisions of the federal government to improve southern forests may justify the irrigation costs necessary to increase southern pine production. (Bell-Cornell)
W78-03652

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

ROUTING OF FLOODS IN RIVER CHANNELS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-03240

OPTIMAL SCHEDULING OF WATER SUPPLY PROJECTS,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
J. Knudsen, and D. Rosbjerg.
Nordic Hydrology, Vol. 8, No. 3, p 171-192, 1977. 5 fig, 1 tab, 8 ref.

Descriptors: *Water supply development, *Water demands, *Project planning, *Scheduling, *Model studies, Mathematical models, Planning, Projects, Water supply, Water sources, Costs, Water costs, Economics, Optimization, Water resources, Resources development.

Some capacity expansion problems encountered in water resources development were studied. Models yielding least-cost schedules (i.e., optimal selection and sequencing of potential projects) in order to meet a stipulated increase in water demand were discussed first. However, uncertainties in the future water demand ought to be taken into account, and therefore, a new general dynamic programming algorithm was developed. Depending on the amount of known detail, the preferences against shortage can be stated. Chance-constraints or penalty functions were included in the optimization. The use of the algorithm as an aid in the current planning was illustrated by solving an example under deterministic as well as stochastic assumptions about the future demand. (Sims-ISWS)
W78-03241

RESEARCH NEEDS IN EROSION AND SEDIMENTATION.
American Geophysical Union, Washington, DC.
For primary bibliographic entry see Field 2J.
W78-03248

CHANNEL MODIFICATION GUIDELINES.
Soil Conservation Service, Washington, DC.
Federal Register, Vol. 42, No. 152, p. 40119-22, August 8, 1977. 1 tab.

Descriptors: *Channels, *Project planning, *Water management(Applied), *Soil conservation, *Wildlife conservation, Wild Rivers Act, Agriculture, Non-structural alternatives, Maintenance, Management, Planning, Fiber crops, Wetlands, Riprap, Channel improvement, Coordination, Ecology, Standards, Aquatic habitats, Balance of nature, Wildlife habitats, Fish conservation, Channel flow, Social needs.

Planned channel modifications often result in confrontations between agricultural and environmental interests. Such modifications can both protect farmland and destroy wetlands. The Soil Conservation Service and the Fish and Wildlife Service have established guidelines to define the conditions under which channel modifications will be considered acceptable by both agencies. Their purpose is to guide the agencies' personnel in identifying when and where channel modification may be used to implement water and related land resource projects through a policy of balancing the need to maintain a naturally functioning ecosystem with economic and social needs. Restrictions are placed on the planning of channel modification projects

which would jeopardize endangered species or alter productive wetlands. No channel modification will be allowed unless the adverse effect on potential or actual wild and scenic rivers is minimal and appropriate protective measures can be taken to minimize the adverse effects of important fish and wildlife values. Types of channel modification and alternatives are listed and described and a chart detailing field level planning coordination between the agencies from preapplication through maintenance is also included. (Spector-Florida)
W78-03350

FORESTED WETLANDS FOR WATER RESOURCE MANAGEMENT IN SOUTHERN ILLINOIS,
Illinois Inst. of Tech., Chicago. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 2H.
W78-03423

PROCEEDINGS, RESEARCH PLANNING CONFERENCE ON THE AQUATIC PLANT CONTROL PROGRAM, 22-24 OCTOBER 1975, CHARLESTON, S.C.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5G.
W78-03429

HISTORY OF THE AQUATIC PLANT CONTROL PROGRAM,
Office of the Chief of Engineers (Army), Washington, D. C. Construction Operations Div.
For primary bibliographic entry see Field 5G.
W78-03430

RECENT SOUTH AMERICAN FIELD STUDIES OF PROSPECTIVE BIOCONTROL AGENTS OF WEEDS,
Agricultural Research Service, Stoneville, MS. Southern Weed Science Lab.
For primary bibliographic entry see Field 5G.
W78-03431

AQUATIC WEED PROBLEMS IN MEXICO AND TEXAS AND SOME OF THE MEASURES FOR THEIR CONTROL,
Texas Parks and Wildlife Dept., San Antonio. Statewide Noxious Vegetation Control Program.
For primary bibliographic entry see Field 5G.
W78-03432

FIELD TRIP, GOOSE CREEK RESERVOIR,
Army Engineer District, Charleston, SC.
J. L. Carothers.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 22-23, December 1976. 2 fig.

Descriptors: *Alligatorweed, *Aquatic weed control, *Biocontrol, *Goose Creek Reservoir(SC), *Alligatorweed flea beetle, Reservoirs, Insects, Agasicles, Alternanthera philoxeroides, Savannah National Wildlife Refuge(SC), South Carolina.

Alligatorweed flea beetles (Agasicles sp) were released in 1965-66 on Goose Creek Reservoir near Charleston, South Carolina to control alligatorweed infestations; by October 1975 the plants had been almost completely eliminated in sections of greatest beetle concentrations. The distance from the bank to the outer edge of the floating mat has been monitored since September 1969 at ten sites. Leaf loss due to senescence and webworm damage could not be estimated. In the southern section of the reservoir, where the beetle population was concentrated, surface vegetation or topgrowth was 98% eliminated in September 1969, and there was extensive feeding in stems. About 20,000 beetles were transferred from Jacksonville, Florida to the reservoir and other locations in Florida, Georgia, Alabama, Mississippi, Texas, South Carolina, and North Carolina in 1965-67. Peak beetle populations occur in May-June and September-October. (See also W78-03429) (Lynch-Wisconsin)
W78-03433

AQUATIC PLANT PROBLEMS IN PUERTO RICO,
Army Engineer District, Jacksonville, FL. Aquatic Plant Control Section.
C. F. Zeiger.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 24-25, December 1976.

Descriptors: *Puerto Rico, *Aquatic weed control, *Water hyacinth, Alligatorweed, Biocontrol, Aquatic weeds, Human pathology, Human diseases, Eichhornia crassipes, Alternanthera philoxeroides, Bilharzia(Schistosomiasis).

The major aquatic nuisance weed in Puerto Rico, water hyacinth (Eichhornia crassipes), is distributed island wide in freshwater lakes, rivers, and streams. Infestation are concentrated in coastal plain areas, especially along the north coast between Rio Grande and Arecibo. Lesser infestations are found in river systems along the southern part of the island from Naguabo to Ponce, and in the southwest from Mayaguez through Valle de Lajas to Yauco. Major invested reservoirs are Lago de Loiza, Lago de Cidra, Lago de la Plata, Lago dos Bocas, Lago Coamo, and Laguna Cartagena. Few problems occur in the mountainous interior. Alligatorweed, Alternanthera philoxeroides, was first reported in Lago Loiza in June 1968, and although currently not a major problem, it could become one. Other problem plants are giant smartweed, naiad, coontail, water lettuce, cattail, algae, and aquatic grasses. Control of these plants will help control the snail Biomphalaria glabrata, carrier of the human disease bilharzia (Schistosomiasis). Because of heavy water hyacinth infestations and the danger of bilharzia, many Puerto Rican lakes, canals, and streams are closed to recreational and other use. Research using biological plant control methods has been recommended in a preliminary reconnaissance report for Puerto Rico, including white amur, water hyacinth beetles, and the alligatorweed flea beetle. (See also W78-03429) (Lynch-Wisconsin)
W78-03434

RECONNAISSANCE SURVEY OF AQUATIC WEED INFESTATIONS IN LAKES AND NAVIGABLE STREAMS IN OKLAHOMA,
Oral Roberts Univ., Tulsa. Dept. of Natural Science.
For primary bibliographic entry see Field 5G.
W78-03435

AQUATIC WEED VERSUS PLANT PATHOGEN, A STUDY OF A BIOLOGICAL CONTROL IN ACTION,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 5G.
W78-03436

CONTROLLED RELEASE HERBICIDES - RUBBER FORMULATIONS,
Creative Biology Lab., Inc., Barberton, OH.
For primary bibliographic entry see Field 5G.
W78-03438

LARGE-SCALE FIELD TEST WITH THE MONOSEX WHITE AMUR IN FLORIDA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5G.
W78-03439

POSSIBLE EFFECTS OF THE INTRODUCTION OF THE WHITE AMUR INTO LAKE CONWAY, FLORIDA,
Florida Univ., Gainesville. School of Forest Resources and Conservation; and Florida Univ., Gainesville. Center for Wetlands.
For primary bibliographic entry see Field 5C.
W78-03440

INTEGRATED CONTROL OF WATER-HYACINTHS WITH FOUR BIOLOGICAL AGENTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5G.
W78-03441

WATERHYACINTHS - A NUISANCE OR A BENEFIT,
National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
For primary bibliographic entry see Field 5G.
W78-03443

FINITE ELEMENT SIMULATION OF OVERLAND AND CHANNEL FLOW,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2E.
W78-03449

SEEPAGE FROM OXIDATION PONDS,
Tahal Water Planning for Israel Ltd., Tel Aviv. Dept. of Sewage Reclamation.
For primary bibliographic entry see Field 5B.
W78-03472

DATA EVALUATIONS AND RECOMMENDATIONS FOR COMPREHENSIVE PLANNING FOR THE YAZOO RIVER BASIN, MISSISSIPPI,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
F. W. Suggitt, T. J. Wood, J. R. Clark, and P. R. Becker.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 360, Price codes: A05 in paper copy, A01 in microfiche, and AD-A029 361, Price codes: A17 in paper copy, A01 in microfiche. Technical Report No. Y-76-2, 2 Vol., August 1976. 470 p, 18 fig, 4 tab, 9 ref, 5 append.

Descriptors: *Planning, *Water resources development, *River basins, *Mississippi, Watersheds(Basins), Rivers, Runoff, Floods, Flood control, Flood plains, Drainage, Environment, Recreation, Social impact, Social change, Economy, Projects, Geology, Vegetation, Aquatic environment, Aquatic life, Data processing, Evaluation, *Yazoo River Basin(Miss).

An evaluation of environmental data requirements and needs for the comprehensive planning of water and related land resources of the Yazoo River Basin was conducted. The information gathered was provided in Volume II of the report (Appendices B,C,D, and E) and covered the geology; physiography; physiochemical characteristics; and the aquatic, terrestrial, and sociocultural resources of the Yazoo Basin. Sufficient data are not currently available to enable the Army Engineer District, Vicksburg, to implement its plan of study in accordance with the guidelines of 'Principles and Standards' of the Water Resources Council; 'therefore, it was recommended that an Information Assimilation and Evaluation Program (IAEP) be initiated in order to formulate and accomplish the plan of study for the Yazoo Basin by 1980. The 5-year program includes the develop-

ment of a Resource Information System for data management; environmental baseline investigations of physical, chemical, biological, and socioeconomic factors; environmental impact investigations of actual construction projects; analysis of changes taking place due to natural processes; and special investigations to evaluate nonstructural alternatives to floodwater and runoff management. Relative cost and duration information for each of the 33 work units in the IAEP was provided. Throughout the description of the IAEP, three points were emphasized: the necessity for information exchange and coordination between work units, response of the IAEP to guidelines of 'Principles and Standards,' and the importance of public participation and coordination in the planning process. (Sims-ISWS)
W78-03473

METHOD FOR CONTROLLING THE GROWTH OF AQUATIC PLANTS,
Aquashade, Inc., Dobbs Ferry, NY. (Assignee).
C.G. Wilson.
U.S. Patent No. 4,042,367, 5 p, 2 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 961, No 3, p 1240, August 16, 1977.

Descriptors: *Patents, *Aquatic plants, *Aquatic weed control, Algal control, Dyes, Organic compounds, Blue dye, Light absorption.

The growth of aquatic plants, and particularly undesirable aquatic plants such as weeds and algae, is controlled by adding a dye to the water in the vicinity of the undesired plant growth. The dye is of a color such that it absorbs a substantial portion of the light at wavelengths normally used by the plants in photosynthesis, so that growth of the plants is stopped or arrested. The color of the dye preferably ranges from blue to green, and preferably is predominantly blue so that the water has a pleasing appearance to the eye. Preferably, the dye is applied prior to germination of the plants and at such further times as necessary. (Sinha-OEIS)
W78-03616

RESERVOIR PLANNING AND OPERATION,
Harvard Univ., Cambridge, MA. Dept. of Engineering and Applied Mathematics.
M. B. Fiering.
In 'Stochastic Approaches to Water Resources, Volume II.' Edited and Published by Hsieh Wen Shen, Colorado State University, Fort Collins, 1976, p 17-1 to 17-21. 19 ref.

Descriptors: *Reservoir operation, *Planning, *Political aspects, *Governments, Hydrologic data, Water quality, Economics, Optimization, *Decision making, Analytical techniques, Computers, Sampling, Simulation analysis, Mathematical models, Projects, Systems analysis, *Data requirements, Resilience, Stability.

This chapter discusses real problems associated with reservoir planning such as politics, data requirements, and the stability and resilience of the system. Attention is drawn to the results of a study on flow synthesis showing that the sampling errors connected with parameter estimation for a normal distribution are much less than those with other distributions. Thus, it is generally better to fit the data with a normal distribution than with other distributions, even though the normal distribution may not be the correct one. Described is an idealization of how a project is initiated and how it progresses through the decision making levels of government. Discussed are: hydrologic, meteorologic, and hydraulic data; water quality; the preliminary model; economic ssues and parameters; measures of risk aversion; and objective function; generation of alternatives; the automatic computer; and institutional requirements. The next section deals with the reality of the planning process and offers reasons for failure of some of the idealism. Considered next are the classical, neo-classical, and romatic traditions of wisdom (including the well- and the ill-tempered computer). The concepts of ecological resilience and statistical robustness are found to be entirely analogous: These two ideas will form the basis of water resource design practice for both quantity and quality control in the near future. (See also W77-10439) (Bell-Cornell)
W78-03630

STOCHASTIC MODELS FOR RESERVOIR DESIGN,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
D. P. Loucks.
In: Stochastic Approaches to Water Resources, Volume II. Edited and Published by Hsieh Wen Shen, Colorado State University, Fort Collins, 1976. p 18-1 to 18-71. 19 fig, 9 tab, 19 ref.

Descriptors: *Stochastic processes, *Model studies, *Reservoir design, *Planning, *Optimization, *Simulation analysis, *Economic efficiency, *River basins, Reservoir storage, Flood control, Water policy, Probability, Markov processes, Streamflow, Constraints, Equations, Systems analysis, Multiobjective planning, Firm yield models, Benefit maximization, Chance-constrained modeling.

Shown are the advantages and limitations of available models for river basin management which incorporate various uncertainties that must be considered in preliminary planning. Discussed are: benefit-loss and cost criteria in investment modeling; multiobjective planning; the trade-offs between quantified objectives; modeling river basin components; firm yield models; modeling stochastic demands; and chance-constrained models. Models are classified either as optimization or simulation models, static or dynamic models, and investment and operating policy or strictly operating policy models. No one model is the most appropriate for analyzing all surface water management problems in all river basins. In choosing the best model for the problem at hand, it is necessary to determine the desired trade-offs among the kinds of information each model can best provide, given limitations of time, money and computer capacity. (See also W77-10439) (Bell-Cornell)
W78-03631

SELECTION OF MODELS FOR URBAN DRAINAGE PROBLEMS: TECHNICAL ASPECTS AND NON-TECHNICAL CONSTRAINTS,
MacLaren (James F.) Ltd., Willowdale (Ontario). Water Resources Group.
P. E. Wisner, A. F. Ashamalla, and P. A. Ahren.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, New York, p 246-263, 1976. 7 fig, 1 tab, 16 ref.

Descriptors: *Urban drainage, *Urban runoff, *Model studies, *Simulation analysis, Hydrology, Constraints, Design, Hydrograph, Storm water, Sewers, Environmental effects, Flow storage, Planning, Costs, Systems analysis, *Rational method, *Hydrograph models.

Presented is an outline of some technical and nontechnical considerations for selection between the two basic techniques in urban drainage: the Rational Method and Hydrograph Models (such as the EPA Storm Water Management Model). The paper considers directly only flow quantity aspects, although it is mentioned that hydrograph simulation is a prerequisite for many quality control aspects. Discussed in the following order are: problems in urban drainage modeling; urban runoff models; a comparison of the two methods for flow simulation; a comparison of the methods for design application, considering the analysis of existing sewer systems and design of relief alternatives, detention storage, master drainage planning, and flow simulation for trunk and interceptor sewers; and finally constraints of urban runoff models with the Rational Method must be based not only on accuracy of flow simulation but also on the scope of drainage studies offered by the different methods. The hydrograph method is shown to be advantageous for flow simulation, where as the Rational Method cannot adequately predict system performance. In the area of design application, many urban drainage problems require sophisticated modeling; however, the large majority of drainage studies is concerned with simpler applications such as the design of storm drainage systems for new subdivisions. In this area, the advantage of models must be further ascertained. (Bell-Cornell)
W78-03633

AGRICULTURAL BENEFIT ASSESSMENT FROM FLOOD CONTROL,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 6F.
W78-03634

MICRO-CLIMATE CONTROL OF DECIDUOUS FRUIT PRODUCTION WITH OVERHEAD SPRINKLERS,
Utah State Univ., Logan.
For primary bibliographic entry see Field 3F.
W78-03635

MANAGEMENT MODEL FOR WASTEWATER DISPOSAL ON LAND,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5E.
W78-03636

MODELS FOR SCHEDULING RELEASES FROM MULTIRESERVOIR SYSTEMS: A STATE-OF-THE-ART REVIEW,
Acres Consulting Services Ltd., Niagara Falls (Ontario).
O. T. Sigvaldason.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 331-348, 1976. 1 fig, 53 ref.

Descriptors: *Reservoir operation, *Reservoir releases, *Scheduling, *Optimization, *Simulation analysis, *Mathematical models, *Water policy, *Stochastic processes, Dynamic programming, Linear programming, Economic efficiency, Algorithms, Benefits, *Reviews, Benefit maximization.

Provided is a brief but informative state-of-the-art overview of the various modeling strategies which are being used for defining policies and procedures for the scheduling of releases from multireservoir systems. The models are separated into three general groups: Optimization models for single reservoirs; optimization models for multireservoir systems; and simulation models. It is concluded that there are strong economic incentives for continuing research in this field, since the economic gains that can be realized from only a modest improvement in operating procedure may amount annually to millions of dollars. The explicit stochastic optimization approach, while being the only technique capable of producing truly optimal solutions, is for all practical purposes computationally intractable for anything except a single reservoir. The implicit stochastic optimization approach is more promising, although it is still being confined to small multireservoir systems; rapid developments in these models are taking place. For larger systems, the most successful modeling

strategy still seems to feature the use of simulation models. (BelllCornell)
W78-03637

WATER QUALITY ASPECTS OF AGRICULTURAL AND URBAN DRAINAGE,
Rice Univ., Houston, TX.
For primary bibliographic entry see Field 5G.
W78-03638

ASSESSMENT OF ENVIRONMENTAL IMPACT ON THE AQUATIC ENVIRONMENT WITH LIMITED DATA,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 5C.
W78-03639

OUTLET DRAINAGE - AN ASSESSMENT OF ENVIRONMENTAL EFFECTS,
Waterloo Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 6B.
W78-03640

SIMULATION OF QUALITY OF URBAN DRAINAGE EFFLUENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W78-03641

INTER-STATE WATER DISPUTES: A CASE STUDY OF INDIA,
Methodist Coll., Fayetteville, NC. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W78-03646

THE COMPLETE DRAINAGE PROGRAM--MORE THAN AN ORDINANCE,
Hydrocomp, Inc., Atlanta, GA.
For primary bibliographic entry see Field 6E.
W78-03650

ASSESSMENT OF WATER RESOURCES FOR NUCLEAR ENERGY CENTERS,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 3E.
W78-03673

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME I,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03682

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME II,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03683

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME III,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03684

4B. Groundwater Management

THE IMPACT OF LAND USE CHANGE ON THE GROUND WATER RESOURCES OF THE BOZEMAN, MONTANA AREA,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
R. L. Brustkern.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 695, Price codes: A03 in paper copy, A01 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Research Report No. 88, September 1977. 38 p, 1 fig, 9 ref, append. OWRT A-078-MONT(1), 14-31-0001-5026.

Descriptors: *Groundwater basins, *Land use, Urbanization, Model studies, Aquifers, Simulation analysis, *Computer models, Computer programs, *Montana(Bozeman Fan).

A finite-difference model of the Bozeman fan aquifer was developed. The model simulates aquifer response to changes in input to the aquifer system. A variety of land-use related changes in input variables may thus be simulated. The computer model simulates the way in which ground water levels fluctuate with changes in input variables such as irrigation water applied, ground water pumping, and evapotranspiration. Since land use change results in changes in input variables such as these, the model can be used to simulate assumed land use change patterns. A qualitative rather than a quantitative emphasis should be placed on the interpretation of simulation results. Large scale land use changes from irrigated agriculture to residential acreage would result in a significant lowering of the water table. Small scale changes of this type would result in a significant lowering of water levels only within and immediately adjacent to the area of change.
W78-03427

CAMBRIAN STRATIGRAPHIC NOMENCLATURE AND GROUND-WATER PROSPECTING FAILURES ON THE HUALAPAI PLATEAU, ARIZONA,
Wyoming Univ., Laramie. Dept. of Geology; and Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 2F.
W78-03445

EFFECT OF VEGETATION ON LANDFILL STABILIZATION,
Auburn Univ., AL. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-03448

FIRST ANNUAL REPORT ENVIRONMENTAL PROTECTION AGENCY/CORPS OF ENGINEERS TECHNICAL COMMITTEE ON CRITERIA FOR DREDGED AND FILL MATERIAL,
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03481

THE RISING COST OF MAKING DESERTS BLOOM,
Earthscan, London (England).
A. Agarwal.
New Scientist, Vol. 76, No. 1073, p 96-97, October, 1977.

Descriptors: *Return flow, *Irrigation practices, *Water reuse, *Groundwater recharge, *Aquifer management, Artificial recharge, Groundwater resources, Desalination, Saline water intrusion, Water utilization, Water pollution control, Waste water treatment.

Israel has adopted extensive programs to utilize marginal water resources such as storm runoff, brackish water, and treated waste water for irrigation and for artificial groundwater recharge. The Dan Region sewage reclamation project, designed to treat 130 mcm of sewage from the greater Tel Aviv area, is scheduled for completion in 1985. Treated sewage has also been used to prevent seawater intrusion into fresh groundwater. One of the major goals of the Israeli water program is to keep water consumption constant without limiting agricultural growth. Water-saving practices in use include drip and sprinkler irrigation, electronically controlled irrigation systems, and irrigation with brackish water. Since Israel's water system now operates as a closed cycle, salt and other dissolved materials such as pesticides, fertilizer nitrates, detergents, and minerals are not regularly flushed from the aquifer. Desalination plants are being considered for aquifer purification. (Schulz-FIRL)
W78-03621

TRACE ELEMENTS IN THE TERRESTRIAL ENVIRONMENT OF A COAL-FIRED POWERHOUSE,
Du Pont de Nemours (E. I.) and Co., Aiken, SC. Savannah River Lab.
For primary bibliographic entry see Field 5A.
W78-03677

THE RELATIONSHIP BETWEEN THE BORON CONCENTRATION OF EAST LANSING MUNICIPAL WASTEWATER AND RETENTION TIME THROUGH THE MICHIGAN STATE UNIVERSITY WATER QUALITY MANAGEMENT PROJECT UNDER CONTINUOUS FLOW CONDITIONS,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 5A.
W78-03680

4C. Effects On Water Of Man's Non-Water Activities

RETENTION OF SOIL WATER FOLLOWING FOREST CUTTING,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 2G.
W78-03252

ALTERATION OF ENVIRONMENTAL CONDITIONS IN CLEARED NARROW STRIPS IN SPRUCE FORESTS OF THE TIEN-SHAN, (IN RUSSIAN),
Akademiya Nauk Kirgizskoi SSR, Frunze. Inst. Biologii.
L. S. Cheshev, and Z. I. Chernykh.
Lesovedenie 1, p 19-26, 1977.

Descriptors: *Clear-cutting, Soil moisture, Soil temperature, Soil erosion, Costs, Forest management, *Picea-schrenkiana, Precipitation(Atmospheric), Snow.

In felled area (Picea schrenkiana stands) more precipitation falls, snow disappears 15-25 days later, soil temperature and moisture are higher, the hydrothermal regime is more favorable, soil water-physical properties remain the same and erosion processes are absent compared to forests. Clear cuttings are acceptable for the Tien-Shan, (Kirgiz SSR, USSR); they are more profitable than selective ones and do not reduce protective properties of the forest.--Copyright 1978, Biological Abstracts, Inc.
W78-03301

SNOW ACCUMULATION AND MELT IN SPRAYED AND UNDISTURBED BIG SAGEBRUSH VEGETATION,
Rocky Mountain Forest and Range Experimentation Station, Collins, CO.
D.L. Sturges.
U.S.D.A. Forest Service Research Note RM-348, Fort Collins, Colorado, September, 1977. 6 p. 4 fig, 6 ref, 2 tab.

Descriptors: *Snow cover, *Snowmelt, *Sagebrush, *Herbicides, 2,4-D, Winds, Vegetation, Snowpacks, Brush, Brush control, Topography.

The influence of big sagebrush control on snow accumulation and melt was studied in a location where wind is an important snow relocation agent. A small (less than 5 cm) but significant reduction in snow accumulation was detected before vegetation was covered by snow on plots sprayed with 2,4-D compared to plots with untreated vegetation. Sagebrush control had no effect upon maximum depth of snow accumulation or snowmelt rates. Snow deposition at the experimental site was controlled by topographic factors once snow depth exceeded vegetation height. (Witt-IPC)
W78-03320

RIVER SHORE DYNAMICS, (IN SWEDISH),
Umea Univ. (Sweden). Dept. of Ecological Botany.
C. Nilsson.
Sven Bot Tidskr 71(1), p 23-28 1977.

Descriptors: *River shores, Alluvial, Meadow, *Regulation, Shrubs, Sweden(River Umealven), Trees, Vegetation.

Recent vegetational changes on an alluvial meadow by the river Umealven (N Sweden), formerly used for hay-making, now affected by water regulation, were studied. The dynamics of the tree and shrub layers during the last century and the changes in the field layer caused by water regulation are described.--Copyright 1978, Biological Abstracts, Inc.
W78-03339

THE IMPACT OF LAND USE CHANGE ON THE GROUND WATER RESOURCES OF THE BOZEMAN, MONTANA AREA,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4B.
W78-03427

ASSESSMENT OF ENVIRONMENTAL IMPACT ON THE AQUATIC ENVIRONMENT WITH LIMITED DATA,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 5C.
W78-03639

IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM, TUCSON, ARIZONA, JULY 9, 1977.
USDA Forest Service, General Technical Report RM-43. 217 p.

Descriptors: *Banks, *Riparian plants, *Southwest U.S., Streams, Birds, Wildlife, Sycamore trees, Cottonwoods, Aquatic habitats, Colorado River, Wetlands, *Riparian habitat, Habitat management, Endangered species, Classification systems.

In the past, use of riparian habitat focused on water management; other values were not considered. Grazing and clearing for agricultural purposes are destroying much of this unique vegetation type. As a basis for management, tentative classification systems for riparian and wetland vegetation in the Southwest are presented. A number of papers consider the biotic importance of this habitat. In the Southwest most fish species occur mainly in riparian habitats. Both breeding and migratory avian populations make use of such habitats. The highest density of nesting birds in North America are reported in Southwestern cottonwood riparian forests. Grazing by cattle inhibits the regeneration of cottonwoods, restricting such forests to the narrow erosion channels. As a case history, the Colorado River with its associated cottonwood forests is discussed. (Stihler-Mass)
W78-03661

PHOTOGRAMMETRY, WATER QUALITY, SAFETY APPURTENANCES, AND SHOULDER DESIGN.
Transportation Research Board, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-03676

4D. Watershed Protection

RESEARCH NEEDS IN EROSION AND SEDIMENTATION.
American Geophysical Union, Washington, DC.
For primary bibliographic entry see Field 2J.
W78-03248

FOREST VEGETATION AS A SOURCE OF BIOGENIC AND ORGANIC SUBSTANCES IN NATURAL INLAND WATERS,
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5B.
W78-03265

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT (VOLUME I-TEXT).
Forest Service (USDA), Washington, DC.
For primary bibliographic entry see Field 5B.
W78-03417

WATER QUALITY ASPECTS OF AGRICULTURAL AND URBAN DRAINAGE,
Rice Univ., Houston, TX.
For primary bibliographic entry see Field 5G.
W78-03638

PHOTOGRAMMETRY, WATER QUALITY, SAFETY APPURTENANCES, AND SHOULDER DESIGN.
Transportation Research Board, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-03676

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

DEVELOPMENT OF A SOIL-WASTE INTERACTION MATRIX FOR ASSESSING LAND DISPOSAL OF INDUSTRIAL WASTES,
Chemical Engineering Research Consultants Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5E.
W78-03222

DEUTERIUM IN HAILSTONES COLLECTED ON 29 NOVEMBER 1972,
National Physical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 2B.
W78-03246

PB210-DETERMINED SEDIMENTATION RATE, AND ACCUMULATION OF METALS IN SEDIMENTS AT A STATION IN CHESAPEAKE BAY,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-03247

AN AUTOMATED SYSTEM FOR COLLECTING, PROCESSING, AND DISPLAYING ENVIRONMENTAL BASELINE DATA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
For primary bibliographic entry see Field 7C.
W78-03256

SELECTIVE ANALYTICAL PARTITIONING OF SEDIMENTS TO EVALUATE POTENTIAL MOBILITY OF CHEMICAL CONSTITUENTS DURING DREDGING AND DISPOSAL OPERATIONS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
J. M. Brannon, R. M. Engler, J. R. Rose, P. G. Hunt, and I. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 247, Price codes: A09 in paper copy, A01 in microfiche. Technical Report D-76-7, December 1976. 176 p, 24 fig, 70 tab, 107 ref, 3 append.

Descriptors: *Sediments, *Chemical analysis, *Dredging, Sampling, Analytical techniques, Chemicals, Ammonia, Nitrogen, Phosphorus, Iron, Manganese, Copper, Zinc, Nickel, Cadmium, Arsenic compounds, Water quality, Water pollution, Water pollution sources, Chemistry, *Dredged material disposal, Dredged materials.

When sediments are agitated by dredging and subsequent resuspension in water by discharge operations, there is a possibility that large amounts of some chemicals in the sediment could be released into the water column. To better understand the short- and long-term release effects of sediment resuspension on water quality, a functionally derived sediment selective extraction procedure was developed. The procedure explores the association of trace metals and other elements or compounds within sediments and their distribution among sediment phases of various stability and mobility. The effect of these sediment fractions or extractable phases upon water quality as indicated by the standard elutriate test and upon the relation of elutriate concentrations to these fractions was investigated thoroughly. The sediment chemical partitions studied in the selective extraction procedure were those dissolved or in solution in sediment interstitial water; sorbed on sediment mineral and organic material (exchangeable); occluded, co-precipitated, or bound within iron and manganese oxide and hydroxide partitions; bound in organic matter as complexes and compounds precipitated as sulfide salts; and occurring as an extremely stable residual partition in mineral crystalline lattices. Results of the sediment partitioning fractionation scheme showed that these operationally or functionally defined phases in a sediment could be isolated with good elemental mass balance and precision among the phases. This procedure was used on marine, estuarine, and freshwater sediments. (Sims-ISWS)
W78-03259

CHEMICAL ANALYSES FOR WATER POLLUTANTS: TRAINING MANUAL.
National Training and Operational Technology Center, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-261 260, Price codes: A08 in paper copy, A01 in microfiche.

Report No. EPA-430/1-75-013, November 1976. 155 p, 49 fig, 21 tab, 84 ref.

Descriptors: *Chemical analysis, *Pollutant identification, Acidity, Alkalinity, Phosphorus, Sediments, *Analytical techniques, Statistical methods, Oxygenation, Hardness(Water), Nitrogen, Carbon, Particulates, Winkler-azide method.

Information used by lecturers at the Environmental Protection Agency National Training and Operational Technology Center when presenting topics in Course 100.3, 'Chemical Analyses for Water Pollutants,' is presented. Areas covered include individual constituents found in water, e.g., dissolved oxygen and information useful to analysts, e.g., statistics. Theoretical concepts are given for acidity and alkalinity determinations, pH measurement, biochemical oxygen demand, dissolved oxygen, calcium and magnesium hardness determination, nitrogen analyses (ammonia, Kjeldahl, nitrate, nitrite), phosphorus determinations, total organic carbon analysis, and total solids determination. A section of laboratory procedures adapted for class groups is included describing the biochemical oxygen demand test (dilution technique), laboratory procedure for dissolved oxygen (Winkler-azide), determination of Kjeldahl nitrogen, determination of nitrate-nitrite nitrogen, and laboratory procedure for total solids, total hardness, phosphorus, acidity, and total alkalinity. (Wares-IPA)
W78-03261

SELECTED ASPECTS OF THE CONTROL OF TOXIC SUBSTANCES (A COMPILATION OF SPEECHES), BY THE MEMBERS OF THE STAFF OF THE OFFICE OF TOXIC SUBSTANCES.
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W78-03263

EVALUATION OF A PROTOTYPE INSTRUMENT FOR DETERMINING PHOSPHORUS IN WATER,
Environmental Research Lab., Athens, GA.
T. B. Hoover, and J. M. Long.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 234, Price codes: A02 in paper copy, A01 in microfiche. Report EPA-600/4-76-033, October 1976. 18 p, 5 fig, 6 ref. Task 72 1BAO27; ROAP 16 ADN.

Descriptors: *Pollutant identification, *Phosphorus, *Spectrometers, *Water pollution, Chemical analysis, Rivers, Sewage, Prototype tests, Research and development, Evaluation, *Flame spectrometers.

A second-generation flame spectrometer for direct determination of phosphorus in water was evaluated. Response to phosphorus in the form of phosphoric acid is linear from 0.5 to 16 ppm phosphorus, and the relative standard deviation is approximately constant at 20% over the range. River water and municipal sewage effluent were analyzed after the addition of phosphoric acid and filtration through a series of microporous membranes. Recovery of the added phosphorus averaged 70% for river water and 95% for sewage effluent after treatment with cation exchange resin. There was no clear relation to filter pore size in the range 5 to 0.2 micrometers. Analyses of higher range EPA Nutrient Reference Samples agreed within one standard deviation with reference values, both for inorganic and total phosphorus. The lower concentration range samples gave barely detectable signals. The prototype flame spectrometer was found to require modification to achieve convenient, safe, and reliable operation in determination of phosphorus in water. (Wares-IPA)
W78-03264

FOREST VEGETATION AS A SOURCE OF BIOGENIC AND ORGANIC SUBSTANCES IN NATURAL INLAND WATERS,
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5B.
W78-03265

SURVEY OF EQUIPMENT AND TECHNIQUES TO IDENTIFY AND QUANTIFY DISCHARGED HAZARDOUS CHEMICALS,
Battelle Columbus Lab., OH.
R. E. Heffelfinger.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 840, Price codes: A04 in paper copy, A01 in microfiche. Final Report No. CG-D-87-76, 1976. 69 p, 6 fig, 7 tab, 1 ref, 2 append. Task No. 4415.1, DOT-CG-23223-A.

Descriptors: *Pollutant identification, *Water pollution, *Chemical analysis, *Analytical techniques, *Equipment, Coasts, Instrumentation, Water analysis, Hazards, On-site data collections, On-site investigations, On-site tests, On-site laboratories, Gas chromatography, Spectroscopy, Spectrophotometry, *Coast Guard, Infrared interferometry.

The results of reseach performed to determine equipment and techniques that may be utilized by the U.S. Coast Guard to identify and quantify hazardous chemical discharges via field-oriented equipment incorporated in a mobile unit are presented. The hazardous chemicals considered are those identified in the Coast Guard's Chemical hazardous Response Information System (CHRIS). The problem approach comprised four tasks: appropriate equipment and techniques were identified; the operational applicability of the equipment and techniques was correlated with generic groupings of chemicals; the most promising equipment and techniques were prioritized as infrared, gas chromatography, wet chemistry (ion selective electrodes, color test equipment, separatory equipment, hot plate, glassware), optical emission spectrography, and ultraviolet visible spectrophotometry; and finally, optional mixes were proposed and a design concept for a mobile laboratory was developed. These mixes were proposed on the basis of options relating to cost: (1) less than $100,000; (2) less than $500,00; (3) no limit; and (4) equipment availablity (infrared interferometry and helicopter deliverable laboratory). Results indicated that the first two cost options are achievable and workable, differing only in user convenience. Little addition benefit is achieved by the absence of a cost limit. The infrared interferometric approach was determined to be achievable, but only with considerable developmental effort. The helicopter-deliverable module was determined to be limited by the lack of availability of a light rugged structure to support necessary equipment. Equipment and techniques that will fit a mobile van laboratory and will provide for identification and quantification of CHRIS chemicals are recommended. The appendices present an evaluation matrix and an applicability matrix. (Wares-IPA)
W78-03266

PRE-SCREENING FOR ENVIRONMENTAL HAZARDS--A SYSTEM FOR SELECTING AND PRIORITIZING CHEMICALS.
Little (Arthur D.), Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03267

APPLICATION OF ESTIMATION THEORY TO DESIGN OF SAMPLING PROGRAMS FOR VERIFICATION OF COASTAL DISPERSION PREDICTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-03275

A SUMMARY OF THE TEST PROCEDURES AND OPERATIONAL DETAILS OF A DELAWARE RIVER AND AN OCEAN DUMPING POLLUTION MONITORING EXPERIMENT CONDUCTED AUGUST 28, 1975,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
W. D. Hypes, and C. W. Ohlhorst.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-16465, Price codes: A03 in paper copy, A01 in microfiche. Technical Memorandum No. NASA TM X-74005, February 1977. 42 p, 11 fig, 14 tab.

Descriptors: *Water pollution,control, *Monitoring, *Remote sensing, *Water quality control, Organic wastes, *Delaware River, Pollutant identification, *Outer Continental Shelf, *Ocean dumping, *Pollution monitoring, Acid wastes, Sea truth, Sensors, Pollution detection.

On August 28, 1975, two remote-sensor evaluation experiments were conducted. One experiment was conducted at the DuPont acid dump site off the Delaware coast. The second was conducted at an organic waste outfall in the Delaware River. The operational objective of obtaining simultaneous sea-truth sampling with remote-sensor overpasses was met. Descriptions of the test sites, sensors, sensor platforms, flight lines, sea-truth data collected, and operational chronology are presented. (Sinha-OFIS)
W78-03280

A PRELIMINARY TEST OF A GOVERNMENT-OWNED LOCAL AREA OIL ON WATER SURVEILLANCE SYSTEM,
Coast Guard Research and Development Center, Groton, CT.
J. R. White.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A040 541, Price codes: A04 in paper copy, A01 in microfiche. Report No. CG-D-121-70, June 1976. 70 p, 23 fig, 11 tab, 3 ref.

Descriptors: *Coasts, *Harbors, *Estuaries, *Water pollution control, New York, Thin films, *Pollutant identification, *Outer Continental Shelf, *Point sensors, *Pollution monitoring, *New York Harbor, Sensors, *Surveillance systems, Oil films.

A field test of three fixed site, oil on water point sensors was conducted in New York Harbor from September 1975 through March 1976. Over 2000 hours of strip chart recordings were analyzed to determine such items as, number of alarms for various threshold levels and time durations, effects of tidal fluctuations, effects of oil background levels, and sensor reliability. In addition, surface samples were obtained and analyzed to provide ground truth data. To be operationally desirable, the sensors comprising a local area surveillance system must unequivocally initiate an alarm in one circumstance only. That is the case when there is a surface oil film large enough to warrant cleanup, preventative measures, or legal action. The result of the Bayonne evaluation indicated that this criteria would be difficult to meet with two types of sensors evaluated. The problems of thin film sensitivity, threshold levels, and alarm time delays combine to raise serious questions to the practicability of employing point sensors in a widespread harbor monitoring system. It appears they would be more effective monitoring specific problem areas such as moored tankers or storm drain outfalls. (Sinha-OEIS)
W78-03281

MARKING THE SEA SURFACE WITH ARTIFICIAL SEA SLICKS AND FLUORESCENT DYES TO AID SEARCH AND RESCUE OR OCEAN DUMPING SURVEILLANCE OPERATIONS,
Naval Research Lab, Washington, DC.
W. R. Barger, and W. D. Garrett.

Available from the National Technical Information Service, Springfield VA 22161 as AD-A037 140, Price codes: A05 in paper copy, A01 in microfiche. Prepared for Coast Guard Office of Research and Development Final Report No. CG-D-107-76, July 1976. 79 p, 15 fig, 5 tab, 15 ref, append. MIPR Z-70099-5-53378.

Descriptors: *Pollutant identification, *Monomolecular films, *Remote sensing, *Marking techniques, *Oil spills, Dyes, Surface waters, Pollution, *Pollution monitoring, *Sea markers, *Pollution detection, Ocean dumping, Uranine, Oil slicks.

A new technique of marking the ocean surface with monomolecular films in combination with dyes was studied in order to develop a practical sea marker which can be detected by airborne remote sensing devices in addition to visual observation. Monomolecular films of surface-active chemicals damp capillary waves on a body of water and can be used to make marks that are detectable day or night by radar. The area of damped waves is also visible to the eye even though the single-molecule-thick film itself is too thin to be seen. Since the film is so thin, a very small amount of material can be used to cover a large area on the surface with a detectable mark. Several water-soluble fluorescent dyes were examined, and uranine was chosed for use in the combined seamarker package. A prototype package for a hand-held marker which dispenses both dye and monolayer-forming chemicals was designed and tested in the field. Based on the laboratory and field data a series of mathematical equations was developed to approximate the shapes, sizes and lifetimes of monolayer slicks under different wind conditions. These equations allow the proper amount of monolayer-forming material to be chosen to make a mark of desired size of lifetime. Practical seamarkers using monolayer-film-forming chemicals in combination with water-soluble fluorescent dyes can be produced for marking objects or activities on the sea surface. The information in this report can be used to produce a dye/slick seamarking device tailored to a specific need. (Sinha-OEIS)
W78-03282

DETERMINATION OF THE ATMOSPHERIC CONTRIBUTION OF PETROLEUM HYDROCARBONS TO THE OCEANS,
World Meteorological Organization, Geneva, (Switzerland).
For primary bibliographic entry see Field 5B.
W78-03285

ANALYSIS OF CHLORINATED COMPOUNDS IN BLEACH PLANT EFFLUENTS (ANALYS AV KLORERADE FORENINGAR I BLEKERIAVLOPPSVATTEN),
Goteborg Univ. (Sweden).
B. Josefsson, and A. Bjorseth.
Nordforsk Miljovardssekretiariatet Publikation No. 2, p 103-112, 1976. 1 fig, 12 ref, 4 tab.

Descriptors: *Bleaching wastes, *Waste identification, *Neutron activation analysis, Wastes, Industrial wastes, Analytical techniques, Chemical analysis, Pulp wastes, Chlorine, Chlorination, Water pollution sources, Pulp and paper industry, Effluents, Pollutant identification, Kraft mills, Sulfite pulp mills.

The mechanism of chlorination (bleaching) of pulp is reviewed, along with the bleaching-effluent composition and specific chlorinated compounds. Neutron activation analysis was used to show the presence of extractable chlorinated compounds of both a nonpolar and a phenolic nature in the bleaching effluents of both kraft and sulfite pulp mills. Total chlorine concentrations ranged from 0.2 to 3.8 ppm. (Speckhard-IPC)
W78-03304

COMPOSITION OF SPRUCE SULFATE PULP BLEACHING EFFLUENTS (ZLOZENIE ODPADOVYCH VOD Z BIELENIA SMREKOVEJ SULFATOVEJ BUNICINY),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
T. Halmova, and L. Balhar.
Papir a Celuloza, Vol. 32, No. 5, p V12-V15, 1977. 3 fig, 12 ref, 4 tab. English summary.

Descriptors: *Bleaching wastes, Wastes, Industrial wastes, Water pollution sources, *Pulp wastes, Pulp and paper industry, Effluents, Chlorides, Chemical oxygen demand, Biochemical oxygen demand, Color, *Waste identification, Chemical properties, *Kraft mills, Spruce trees.

Kraft pulps with a Kappa-number of 31.9, 39.5, and 55.4 were prepared and bleached in the laboratory, using the CEHDED sequence. For each pulp, the filtrates after individual bleaching stages were collected and analyzed for chlorides, COD, 5-day BOD, and color. With pulp of higher unbleached kappa-number the pollution load generated during bleaching increased. Depending on the unbleached pulp kappa-number, chlorides ranged from 104.02 to 128.44 kg/ton, COD (chromate method) from 74.04 to 130.54 kg/ton, BOD from 11.14 to 21.74 kg/ton, and color from 171.57 to 299.88 kg/ton (platinum method). The highest portion of the pollution load originated from the alkaline extraction stage. (Trubacek-IPC)
W78-03309

IDENTIFICATION AND REMOVAL OF TOXIC MATERIALS FROM KRAFT AND GROUNDWOOD PULP MILL EFFLUENT,
B. C. Research Ltd., Vancouver.
For primary bibliographic entry see Field 5D.
W78-03311

CORRECTION FACTOR FOR ANTHRONE CARBOHYDRATE IN COLORED WASTE WATER SAMPLES,
University of Western Ontario, London.
A. Leduy, N. Kosaric, and J. E. Zajic.
Water Pollution Research Canada, Proceedings 10th Canadian Symposium, 1975, p 126-131. 5 fig, 3 ref, 1 tab.

Descriptors: *Waste water(Pollution), *Carbohydrates, *Sulfite liquors, *Spectrophotometry, Pulp wastes, Wastes, Industrial wastes, Water pollution sources, Biochemical oxygen demand, Color, Pulp and paper industry, Effluents, Waste dilution, Analytical techniques, Organic compounds, *Pollutant identification, Spent sulfite liquors.

Spectrophotometric determination of total carbohydrate in waste water samples by anthrone reagent is a simple and rapid method for following the utilization of substrate and hence the reduction in 5-day BOD during biological treatment with chemoheterotrophs. However, for colored waste water samples or treatment plant effluents, a correction factor was found necessary to compensate for color interference. Studies were conducted on various spent sulfite liquors (ammonium, calcium, magnesium, sodium, and mixed base) with a wide range of colors from creamy to black. The correction factor was calculated from the deviation of the standard calibration curves of glucose with and without the presence of spent sulfite liquor. These correction factors depended both on the nature and on the amount of spent sulfite liquor present. Within the practical dilution range of various spent sulfite liquors for the determination of total carbohydrate, the correction factors varied from 15 to 40%. In all spent sulfite liquor samples, the correction became more significant at higher concentrations of spent liquor in the solution. Spectrophotometric studies of spent sulfite liquor at various concentrations within the visible range led to the development of an empirical equation expressing color as a function of solvent (water) color and spent liquor dilution, critical dilution, and chromatic index. (Speckhard-IPC)
W78-03321

THE ACCUMULATION OF 90 SR BY FRESHWATER PLANTS IN BODIES OF WATER OF THE STEPPE ZONE OF THE UKRAINIAN SSR, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Univ. (USSR). Research Inst. of Biology.
T. A. Murzina, I. P. Lubyanov, and A. M. Chaplina.
Gidrobiol Zh 12(6), p 76-80, 1976.

Descriptors: *Strontium-90, Aquatic plants, *Bioindicators, *Pollutant identification, Calcium, *Chara-Sp, *Myriophyllum-spicatum, *Potamogeton-perfoliatus, *USSR(Ukranian SSR).

Freshwater plants in several bodies of water in the Ukrainian SSR (USSR) were capable of accumulating 90 Sr in concentrations 10-100 times the 90 Sr level in the water. The accumulation coefficient was a function of species and ecological specificity (high in submerged plants, low in semisubmerged), the seasons (increase from spring to summer, decrease in fall), and the water Ca level (higher Ca concentrations were accompanied by lower 90 Sr accumulation levels). Of the studied plant species, Potamogeton perfoliatus, Myriophyllum spicatum and especially Chara sp. can be recommeded as bioindicators of 90 Sr pollution.--Copyright 1978, Biological Abstracts, Inc.
W78-03334

MERCURY DISTRIBUTION IN SOIL AROUND A LARGE COAL-FIRED POWER PLANT,
Environmental Monitoring and Support Lab., Las Vegas, NV. Monitoring Systems Research and Development Div.
For primary bibliographic entry see Field 5B.
W78-03418

MONITORING HEAVY METALS AND PESTICIDES IN THE CAPE FEAR RIVER BASIN OF NORTH CAROLINA,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Engineering.
F. K. Pfaender, M. S. Shuman, H. Dempsey, and C. W. Harden.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 703, Price codes: A08 in paper copy, A01 in microfiche. North Carolina Water Resource Research Institute, Raleigh, UNC-WRRI Report No. 126, October 1977. 151 p, 16 fig, 22 tab, 130 ref, 2 append. OWRT A-073-NC(2), 14-31-0001-5033.

Descriptors: *Metals, *Heavy metals, *Trace elements, Ion exchange, Adsorption, Analytical techniques, Chromium, Cadmium, Copper, Mercury, Zinc, Lead, Monitoring, *Pollutant identification, *Path of pollutants, Pesticides, Pesticide residues, *Trace metals, Resins, *Haw River(NC), *North Carolina, *Cape Fear River(NC).

A research effort to examine new methods for monitoring heavy metals and pesticides in natural waters of North Carolina was undertaken. The methods developed were applied to a monthly sampling of the Cape Fear River Basin. The heavy metals (chromium, cadmium, copper, lead and zinc) monitoring technique was based upon the field application of cationic and anionic ion exchange resins to examine various species of the metals. Macroreticular XAD resins were used to concentrate the pesticides, atrazine, DDT (DDE, DDD), diuron, methyl parathion and trifluralin, from water. Monthly samples from 10 sites in the Cape Fear River Basin indicated that anionic chromium species were present at all sites except the farthest upstream (indicating anthropogenic inputs), that metal concentrations generally decrease as the water flows downstream, and that

there were no evident correlations between metal concentrations and flow or rainfall. Cr, Cu and Cd appear to come principally from industrial and municipal sources, while Zn and Pb appear to have non-point source origins. Only Pb values at two stations exceeded the EPA maximum values for public water supply. Zn, Cd, and Cr exceeded proposed minimal risk values. Trifluralin was the most commonly observed pesticide compound present in 97% of the samples. Atrazine, although present in only 42% of the samples represents the pesticide present in highest concentration and transported in greatest quantity in the water. DDT, DDE and methyl parathion were also commonly detected, with diuron less frequently encountered. (Kiger-NC State)
W78-03426

DEVELOPMENT OF SUSPENDED SOLIDS QUALITY CONTROL AND PERFORMANCE EVALUATION SAMPLES,
Weston (Roy F.), Inc., West Chester, PA.
E. L. Stover, and P. J. Marks.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 250, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-600/4-76-052, October 1976. 39 p, 2 fig, 11 tab, 14 ref. 1H0621, 68-03-2333.

Descriptors: *Pollutant identification, *Monitoring, *Quality control, *Water quality standards, Calibrations, Performance, Solid wastes, Suspended solids, Water pollution sources, Coals, Sampling, Rayon, Fuller's earth.

A two-phase study was conducted to develop a synthetic suspended solids sample for use as quality control check and performance evaluation within environmental monitoring laboratories. The first phase consisted of a feasibility study to determine compounds that exhibited the optimum physical and chemical properties for synthetic suspended solids samples and the second phase involved production of suspended solids samples in individual containers. Considerations of such factors as solubility, wettability, dispersion, flocculation, abrasion, biodegradability, stability, and subsampling recovery resulted in the selection of anthracite coal, Fuller's earth, and rayon fibers as solids materials for suspended solids quality control samples. A total of 10,000 quality control samples, each consisting of one of three specified weights of one of these three compounds, was packaged in individual containers. It was concluded that precision and accuracy obtainable in the suspended solids test depend, within limits, on the specific gravity and particle size of the solids. Also, the accuracy of the subsampling step is dependent to some degree upon the dispersion characteristics of the suspended solids in the sample. Recommendations to minimize variability in quality assurace data and to evaluate analytical results are included. (Wares-IPA)
W78-03450

EVALUATION OF INSTRUMENT FOR THE DETERMINATION OF PHENOL IN WATER,
Central State Univ., Wilberforce, OH. Dept. of Chemistry.
L. S. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 936, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/4-76-048, September 1976. 34 p, 9 fig, 7 tab, 47 ref, 1 append. 1HA-323-JBA-027, R-803172-01.

Descriptors: *Pollutant identification, *Instrumentation, *Phenols, *Spectrometer, Pollutants, Analytical techniques, Water pollution, Methodology, Sampling, Bathymetry, *Spectra PH-2 Phenol Instrument, 4-AAP method, Bathochromic shift, Phenolic compounds.

The Spectra Product's PH-2 Phenol Instrument (ultraviolet spectrophotometer), designed specifically for the determination of phenolic compounds in water and wastewater, was evaluated for applicability to water pollution assay. The analytical procedure is based on the measurement of the bathochromic shift that occurs with phenol when pH of the solution is changed from pH 4 to pH 12. The method allows for the rapid, sensitive, and reproducible analysis of phenols. The time of a single analysis exclusive of any distillation that may be necessary, is less than five minutes. Results of evaluation show than the determination of phenols in water can be otained with an accuracy of plus or minus 5% in the range of 50 ppb to 50 ppm and with an accuracy of plus of minus 12% in the range of 5 ppb to 50 ppb. The results of the evaluation were based on analysis of variety of synthetic samples of phenol and of substituted phenols and their mixtures, and of real samples from a number of sampling site in the local area. It was concluded that the pH-2 instrument gives more precise results than 4-AAP methods and can be used to detect para substituted phenols, but as with the 4-AAP method the pH-2 instrument method cannot be used to detect all substituted phenols quantitatively. (Wares-IPA)
W78-03452

PRECIPITATION PRODUCTS IN THE FE(II) AND TRISODIUM-PHOSPHATE SYSTEM AT PH 2.5-13.0, (IN GERMAN),
Goettingen Univ. (West Germany). Abt. Oekochemie.
For primary bibliographic entry see Field 5F.
W78-03454

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II - FINAL REPORT (APPENDIX, LISTING OF REFERENCES),
Stanford Research Inst. Menlo Park, CA.
S. L. Brown, F. Y. Chan, J. L. Jones, D. H. Liu, and K. E. McCaleb.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 165, Price codes: A10 in paper copy, A01 in microfiche. Report No. NSF-RA-E-75-190E, April 1975. 214 p, 2,363 ref. SRI ECU-3386.

Descriptors: *Chemical properties, *Environmental effects, Physical properties, Biological properties, Chemical industry, Hazards, Public health, Chemicals, *Bibliographies, Pharmacology, Toxicology.

The fifth volume of a report on the study of 80 chemicals, identified as having the greatest potential for environmental effects, contains a listing of the references for the data collected and general notes describing the data. Information was collected on the extent of the exposure of the environment to these chemicals (during manufacture and use) and on the possible environmental effects of this exposure (chemical, physical, and biological properties, persistence, and toxicity). A questionnaire survey of industry was conducted to determine the amount and types of losses in the manufacturing plants, and survey information was tabulated. Summary reports, submitted for each chemical included flow diagrams showing industrial data on the amounts used for various applications, assessment of data gathered on toxicology and environmental persistence, computer printout of a tabular summary of important data gathered, and copies of 25 most pertinent abstracts found on toxicology. Numbered references list the author, publication, date of publication, and chemical substance(s) discussed therein. (Wares-IPA)
W78-03456

USER HANDBOOK FOR THE ALLOCATION OF COMPLIANCE MONITORING RESOURCES,
Systems Control, Inc., Palo Alto, CA.
For primary bibliographic entry see Field 5G.
W78-03458

GRAND TRAVERSE BAY LIMNOLOGICAL DATA,
Michigan Univ., Ann Arbor. Sea Grant Program.
For primary bibliographic entry see Field 2H.
W78-03488

THE EFFECT OF SLUDGE DIGESTION ON VIRUS INFECTIVITY,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Dept. of Virology and Immunology.
For primary bibliographic entry see Field 5C.
W78-03517

A NEW MODEL OF PLANKTON DREDGE FOR COLLECTING SAMPLES OF WATER AND PLANKTONIC ORGANISMS, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Inst. Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
For primary bibliographic entry see Field 7B.
W78-03524

GAS CHROMATOGRAPHIC-MASS SPECTROMETRIC IDENTIFICATION OF PHENOLS AND AROMATIC ACIDS IN RIVER WATERS,
Tokyo Metropolitan Univ. (Japan). Dept. of Chemistry.
G. Matsumoto, R. Ishiwatari, and T. Hanya.
Water Research, Vol. 11, No. 8, p 693-698, 1977. 7 fig, 2 tab, 21 ref.

Descriptors: *Analytical techniques, *Phenols, *Pollutant identification, *Gas chromatography, *Mass spectrometry, Solvent extractions, Separation techniques, Aromatic compounds, Path of pollutants, Water pollution sources, Rivers, Industrial wastes, Municipal wastes, Waste water disposal.

The presence of phenols and aromatic acids in the Tama and Sumida Rivers in Tokyo, Japan, was investigated in laboratory experiments with gas chromatography-mass spectrometry. Water samples were subjected to ethyl acetate extraction and silica gel column chromatography. Separation procedures used for the analysis of phenols and aromatic acids are described. Analyses indicated that the ratio of ethyl acetate extracts to total organic matter was about 10% for each river water sample. Phenols and aromatic acids identified in the Tama River included: pentachlorophenol, phthalic acid, trimesic acid, p-hydroxybenzoic acid, vanillic acid, syringic acid, p-coumaric acid, ferulic acid, bisphenol A, o-hydroxybenzoic acid, and m-hydroxybenzoic acid. All of these compounds except p-courmaric acid, ferulic acid, and bisphenol A were detected in the Sumida River. Possible sources are hypothesized for each of the compounds. It is suggested that pentachlorophenol, bisphenol A, and phthalic acid are probably industrial in origin, while phenolcarboxylic acids probably originated from lignin-like matter and urine. (Schulz-FIRL)
W78-03560

ULTRASONIC SLUDGE DIP STICK.
Water Services, Vol. 81, No. 978, p 526-527, August, 1977.

Descriptors: *Automation, *Monitoring, *Settling basins, *Ultrasonics, *Equipment, Electronic equipment, Analytical techniques, Remote control, Separation techniques, Sludge treatment, Municipal wastes, Industrial wastes, Waste water treatment.

The USP 10 ultrasonic sludge level meter has been produced by Krohne Measurement and Control Ltd. of Moulton Park, England. A probe which contains an ultrasonic transmitter/receiver is suspended from a fixed cabinet in the sludge settling tank. The strength of pulses returned by a reflector connected to the probe is proportional to the position of the sludge interface, with pulses

being weaker when absorption by suspended solids is at its maximum. The probe measuring depth range is 1-10 m and the probe can be raised and lowered automatically or manually. The probe can be positioned to correspond to suspended solids contents of 0.3-10%, and indication of the probe depth is available. The probe can be moved at a speed of 0.66 m/min. With the use of two limit switches, the input of raw material and the extraction of clear water and sludge can be controlled. (Schulz-FIRL)
W78-03561

SEROLOGICAL TYPING AND CHLORINATION RESISTANCE OF WASTEWATER CYANOPHAGES,
Virginia Commonwealth Univ., Richmond. School of Dentistry.
J. L. Stanley, and R. E. Cannon.
Journal Water Pollution Control Federation, Vol. 49, No. 9, p 1993-1999, September, 1977. 2 fig, 2 tab, 15 ref.

Descriptors: *Bioindicators, *Viruses, *Cyanophyta, *Algae, *Path of pollutants, Analytical techniques, Microorganisms, Disinfection, Chlorination, Bioassay, Sewage bacteria, Pollutant identification, Effluents, Waste water treatment.

The chlorine resistance of waste water-isolated cyanophages and their ecologic distribution according to serological typing were evaluated with regard to the use of LPP-cyanophages as possible indicators of animal viruses and coliforms in waste water. Samples of waste water were collected on a biweekly basis from the inflow, following primary settling tanks, following trickling filtration, and after chlorination of LPP-cyanophages and Plectonema boryanum, a species of filamentous blue-green algae which is attacked by LPP-cyanophages, were measured. Cyanophages were observed in waste water on a year-round basis, with a decline during the winter months attributed to a decline in the cyanophage host algae. Studies on inactivation of stock cyanophages and cyanophages isolated from waste water indicated that the latter were much more resistant to chlorination. Since cyanophages also appear to be more resistant to chlorination than enteric viruses, cyanophage monitoring is suggested as an inexpensive, reliable, simple method of testing for viral and bacterial contamination. (Schulz-FIRL)
W78-03562

HOW RELIABLE IS INSTRUMENTATION IN WASTEWATER APPLICATIONS,
Raytheon Co., Portsmouth, RI.
A. E. Molvar, R. H. Babcock, J. F. Roesler, and R. H. Wise.
Instruments and Control Systems, Vol. 150, No. 10, p 29-33, October, 1977. 1 tab.

Descriptors: *Monitoring, *Automation, *Flow meters, *Analytical techniques, *Equipment, Dissolved oxygen analyzers, Hydrogen ion concentration, Water analysis, Chemical analysis, Waste water treatment.

Measurement principles, potential applications, operating characteristics, and user's experiences are discussed for analytical sensors, transducers, and monitoring devices observed during a survey of 50 waste water treatment plants. Data presented for instrument operating experiences include variable, type of instrument, applications, typical cost, mean time between failures, typical life expectancy, and maintenance requirements in terms of frequency/hr, maintenance-hrs/yr, and skill level. Types of instruments discussed include level-measuring devices, flow meters, wet chemical analyzers, sludge density meters; and pH electrodes. Monitors for TOC, COD, TOD, DO, residual chlorine, chlorine gas, flammable gas, and turbidity are also evaluated. (Schulz-FIRL)
W78-03563

STUDY OF POLYSACCHARIDES IN ACTIVATED SLUDGE MUCILAGE (ETUDE DES POLYOSIDES DU MUCILAGE DES BOUES ACTIVEES),
Institut National de la Recherche Agronomique, Villeneuve d'Ascq (France). Station de Technologie Alimentaire.
For primary bibliographic entry see Field 5D.
W78-03565

DISSOLVED SOLIDS IN WASTEWATER,
Connecticut Univ., Stors.
For primary bibliographic entry see Field 5B.
W78-03567

VENTURI FUMES AND REQUIREMENTS FOR MEASUREMENTS TECHNIQUES FOR EXACT MEASUREMENTS OF QUANTITIES OF WASTE WATER VENTURIKANAELE UND MESSTECHNISCHE ANFORDERUNGEN FUER GENAUE ABWASSERMENGEN),
Zuellig A. G., Rheineck (Switzerland). Apparatebau fuer die Wasserwirtschaft.
H. Zuellig.
Wasser, Energie, Luft, Vol 69, No 5, p 111-115, 1977. 9 fig, 4 ref.

Descriptors: *Venturi meters, *Venturi flumes, *Flowmeters, *Flow measurement, *Hydraulic structures, Water measurement, Monitoring, Instrumentation, Gages, Flow rates, Waste water treatment.

Venturi flumes and flow measurement techniques are described with respect to waste water flow measurements at treatment facilities. Venturi flumes with U or hexagonal profile and parabolic or trapezoidal throat are best for exact measurements, especially at low flow velocities. The required accuracy of the flow measurement (+ or - 0.25% of the end value) can be achieved by the air bubble or sonic depth finder methods. (Takacs-FIRL)
W78-03569

DETERMINATION OF HEAVY METALS IN SEWAGE-BASED FERTILIZER USING SHORT-LIVED ISOTOPES,
Surrey Univ., London (England). Dept. of Physics.
A. Egan, and N. M. Spyrou.
Journal of Radioanalytical Chemistry, Vol. 37, No. 2, p 775-784, 1977. 3 tab, 18 ref.

Descriptors: *Pollutant identification, *Neutron activation analysis, *Analytical techniques, *Heavy metals, *Radioisotopes, *Irradiation, Data processing, Computer programs, Chemical analysis, Sewage, Fertilizers, Industrial wastes, Municipal wastes, Metals, Waste water treatment.

A fully instrumental method of neutron activation analysis is presented for use in the analysis of heavy metals present in sewage sludge. Objectives of the project under which the procedure was devised included the development of a means of analysis based on a fixed experiment time per sample, non-destructive irradiation and count, fully instrumental data collection, standard computing procedure, absolute determination of microgram quantities, and accuracy compatible with sampling uncertainties. The method which was developed is based on short-lived isotopes and requires a total experiment time of 1 hr per sample. Cyclic irradiation based on period of radiation to measure 207 Pb (T=0.8s) was used to activate the samples. Gamma ray spectral data obtained by the Ge(Li) detectors were transferred to magnetic tape and analyzed by the SAMPO spectral analysis program. Modifications to the SAMPO program included the addition of an IDENTIFY subroutine which included a library of peaks for identification followed by a quantitative determination of the mass of the target element, eliminating the need for standards. Sample and standard preparation, irradiation and counting conditions, sensitivities and detection limits, and data-processing methods are presented. (Schulz-FIRL)
W78-03571

PHOTOMETRIC DETERMINATION OF TOTAL PHOSPHATE WITH HYDRAZINE-MOLYBDIC ACID REAGENT (PHOTOMETRISCHE BESTIMMUNG DES GESAMTPHOSPHATS MIT HYDRAZIN-MOLYDAENSAEURE-REAGENZ),
Stadt Dusseldorf (West Germany). Chemisch-Biologische Lab.
A. Beyer.
Gas- und Wasserfach, Wasser-Abwasser, Vol. 118, No. 7, p 327-332, 1977. 6 tab, 5 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Photometry, *Phosphates, *Water analysis, *Chemical reactions, Chemical analysis, Phosphorus, Hydrolysis, Waste water treatment.

A photometric method for the determination of the total phosphate content in water is described. After treatment with sulfuric acid, the condensed phosphoric acid is hydrolyzed to orthophosphoric acid by boiling with distilled water. The acid is neutralized, and a 40-ml sample is successfully combined with 1 ml of 2% citric acid and 9 ml of hydrazine sulfate-molybdic acid reagent. The flask is heated in a boiling water bath for 30-60 min to develop the colored complex. The extinction is measured at room temperature against a blank sample of distilled water treated in the same manner. The method permits the accurate and reproducible determination of 4-260 micrograms PO(4) per 40 ml. Heavy metal ions and silicic acid do not falsify the results. Chromate reduces the readings at concentrations of about 15 mg/liter and over. Sulfuric acid up to 0.25 g/40 ml has no influence on the result. Nitrate has to be destroyed when present in concentrations exceeding 2.5 mg/liter. (Takacs-FIRL)
W78-03572

POLLUTION MONITORING WITH TOTAL ORGANIC CARBON ANALYSIS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineering.
R. L. Chandler, J. C. O'Shaughnessy, and F. C. Blanc.
Journal Water Pollution Control Federation, Vol. 48, No. 12, p 2791-2803, December, 1976. 11 fig, 2 tab, 4 ref.

Descriptors: *Pollutant identification, *Analytical techniques, *Water analysis, *Biochemical oxygen demand, *Chemical oxygen demand, *Carbon, Organic compounds, Monitoring, Water pollution control, Effluents, Municipal wastes, Industrial wastes, Waste water treatment.

A TOC analyzer which oxidizes organic carbon in the sample to CO2 and then reduces the CO2 to CH4 was used in experiments to evaluate the use of TOC as an indirect measure of BOD and COD in domestic and industrial waste water treatment and river quality monitoring. Correlations between BOD, COD, and TOC are described. Experiments with municipal waste water indicated that there was a significant correlation between 5-day BOD and TOC for samples from a specific location within a treatment process. In general, the correlation between TOC and 5-day BOD in domestic secondary effluents was greater than the relationship between TOC and COD. Regression equations for nitrification-inhibited and noninhibited 5-day BOD yielded values which were significantly different at the 0.10 level. Analysis of TOC measurements is also suggested to evaluate activated carbon for advanced waste water treatment, to monitor substrate-removal batch-treatibility studies, and to monitor industrial waste water for fluctuations in strength. The correlation between 5-day BOD and TOC in river water was significant at the 0.01 level, although this decreased as the river approached higher flow conditions. TOC

measurements are reported as unaffected by a sample storage period of 1 wk, provided the samples are acidified, capped, and refrigerated. (Schulz-FIRL)
W78-03574

A MERCURY-FREE ACCELERATED METHOD FOR DETERMINING THE CHEMICAL OXYGEN DEMAND OF LARGE NUMBERS OF WATER SAMPLES BY AUTOCLAVING THEM UNDER PRESSURE WITH ACID-DICHROMATE,
National Swedish Environment Protection Board, Uppsala (Sweden). Algal Assay Lab.
S-O. Ryding, and A. Forsberg.
Water Research, Vol 11, No 9, p 801-805, 1977. 2 fig, 2 tab, 10 ref.

Descriptors: *Analytical techniques, *Water analysis, *Chemical oxygen demand, *Pollutant identification, Water pollution control, Monitoring, Sampling, Chemical reactions, Effluents, Waste water treatment.

A simplified colorimetric method for measuring COD in waste water effluents and receiving waters was developed in response to a program initiated in 1972 by the National Swedish Environment Protection Board to assess the effects of tertiary treatment on receiving waters. The RR method, named for a Swedish abbreviation for the words waste water treatment plant and receiving body of water, has been adapted for use with either waste water or fresh water with a detection range of 10-300 and 10-100 mg 02/liter, respectively. Details of the apparatus, reagents, and procedure are presented. Reagents include potassium dichromate, sulfuric acid, silver sulfate, ferrous ammonium sulfate, and a ferrion indicator solution. The method requires small sample and reagent volumes of 1.0 and 2.0 mls, respectively, and does not require mercury. The procedure includes the rapid addition of amixture of all the reagents to the sample and auto-claving for 1 hr in flasks fitted with glass stoppers. Titration of the excess dichromate with ferrous ammonium sulfate and the ferrion indicator is used to calculate the COD from dichromate. Parallel analyses with the RR method and KMn04 consumption of 318 samples from 14 waste water receiving lakes yielded a correlation coefficient (r) of +0.90. Possible interference is presented by chloride at concentrations greater than 1 g/liter. (Schulz-FIRL)
W78-03577

IDENTIFICATION OF END PRODUCT RESULTING FROM OZONATION AND CHLORINATION OF ORGANIC COMPOUNDS COMMONLY FOUND IN WATER,
Illinois Univ. at Urbana-Champaign. Dept. of Environmental Engineering.
P. P. K. Kuo, E. S. K. Chian, and B. J. Chang.
Environmental Science and Technology, Vol 11, No 13, p 1177-1181, December, 1977. 7 fig, 4 tab, 22 ref.

Descriptors: *Pollutant identification, *Organic wastes, *Chlorination, *Ozone, Chemical reactions, Chemical wastes, Municipal wastes, Reverse osmosis, Effluents, Ultraviolet radiation, Waste water treatment, Analytical technique, Water analysis, Oxidation.

Chlorination of the humic acid materials in the ultra-filtration (UF) retentate and of the fulvic acid materials in the reverse osmosis (RO) retentate of secondary effluents can result in the formation of potentially toxic halogenated organics. Studies were conducted on the effects of ozonation with and without ultraviolet irradiation on 2-propanol, acetic acid, and oxalic acid. These compounds have been identified as poorly removed by RO and activated carbon in municipal waste water treatment. Further studies examined the formation of volatile halogenated organics during chlorination and ozonation of the UF and RO retentates of municipal secondary effluent. The ozonation studies indicated that 2-propanol was oxidized to acetone which was, in turn, oxidized to acetic and oxalic acids. Ozonation of acetic acid yielded glyoxylic and oxalic acids. Ultraviolet irradiation significantly enhanced the removal of organics during ozonation, increasing the rate constant for organic carbon removal by a factor of 8 for 2-propanol and by a factor of 6 for acetic acid. Volatile halogenated organics detected in the chlorinated UF and RO retentates included: methylene chloride, chloroform, carbon tetrachloride, bromodichloromethane, chlorodibromomethane, and bromoform. (Schulz-FIRL)
W78-03578

CHEMICAL MONITORING OF SEWAGE SLUDGE IN PENNSYLVANIA,
Pennsylvania Agricultural Experimental Station, University Park.
W. T. Doty, D. E. Baker, and R. F. Shipp.
Journal of Environmental Quality, Vol 6, No 4, p 421-426, October-December, 1977. 1 fig, 1 tab, 26 ref.

Descriptors: *Monitoring, *Sampling, *Fertilizers, *Heavy metals, *Chemical analysis, Cadmium, Zinc, Copper, Zinc, Lead, Chromium, Food chain, Sludge disposal, Treatment facilities, Municipal wastes, Effluents, Waste water treatment, Waste water disposal.

A one-year sampling program of sewage from six Pennsylvania cities was initiated to determine the sampling procedures required for the chemical monitoring of sewage sludge destined for land application. The program emphasized techniques required for a municipal waste water treatment plant which treated combined domestic and industrial wastes. Bi-weekly samples were collected at each plant and analyzed for solids, total-N, NH4-N, P, K, Na, Ca, Mg, Al, Fe, NO3-N, Mn, Cd, Co, Cr, Cu, Ni, Pb, Zn, and pH. The data revealed that sewage sludge from every treatment plant varied significantly over time with respect to almost every composition variable. The differences in solid concentrations were greater between the different plants than the material from any given plant. In general, solids concentrations varied inversely with respect to changes in total-N. Although the variation in sludge composition was significant with respect to time, no seasonal trends were observed. Since the nitrogen concentration in sludge from all plants ranged from 1-36% of the dry solids and phosphorus ranged from 1-6%, the prediction of the fertilizer value of the sludge was considered impossible without continuous chemical analysis. Heavy metal concentrations, particularly Cd, were considered the limiting factor in the feasibility of land application of the sludge since only 35% of the sludges analyzed were acceptable for application to cropland and 25% were in ranges which could adversely affect crop composition and the food chain. (Schulz-FIRL)
W78-03579

LEAK TESTING WITH DYED LIQUID TRACERS,
Shannon-Glow Inc., Los Angeles, CA.
For primary bibliographic entry see Field 5B.
W78-03580

COMPARISON OF MEMBRANES FOR FECAL COLIFORM RECOVERY IN CHLORINATED EFFLUENTS,
Illinois State Water Survey, Peoria. Water Quality Section.
S. D. Lin.
Journal Water Pollution Control Federation, Vol. 49, No. 11, p 2255-2265, November, 1977. 4 tab, 21 ref.

Descriptors: *Membrane processes, *Analytical techniques, *Coliforms, *Sewage bacteria, *Chlorination, Disinfection, Filtration, Membranes, Water analysis, Effluents, Waste water treatment.

Various membrane-based techniques have been proposed for the enumeration of fecal coliforms in waste water effluents. Ten varieties of commercially available membranes were tested for their ability to recover fecal coliforms from chlorinated effluents. Grab samples of secondary and tertiary effluents were obtained from five Illinois waste water treatment plants. Statistical analyses of fecal coliform data obtained with the ten membranes revealed significant differences in performance. Membrane capabilities fell into four groups, with greater differences in fecal coliform recovery occurring between groups than within a group. The Millipore HC, Gelman GN-6, and Sartorius SM 138 06 (green) membranes yielded the highest fecal coliform recovery in chlorinated effluents, while the J-M radiation membrane gave the lowest recovery. Colony size also varied with respect to membrane type, with the Nuclepore membrane yielding the largest colonies. An average of 93.2% of the 1002 blue colonies isolated from all the filters was verified. Membrane characteristics and previous studies on factors which influence membrane performance are discussed. (Schulz-FIRL)
W78-03581

STRONTIUM-90 CONCENTRATIONS IN THE BOTTOM BRINE AND SEDIMENTS OF LAKE SIVASH AS DEPENDENT ON THE HYDROCHEMICAL ENVIRONMENT, (IN RUSSIAN),
V. P. Barannik, V. A. Zhorov, and V. N. Markelov.
Okeanologiya 16(6), p 995-1001, 1976.

Descriptors: *Strontium-90, *Lake sediments, *Bottom brine, Radioisotopes, *Radioactivity, Pollutant identification, Ions, Salinity, Sulfates, *USSR(Sivash Lake).

The bottom brine and sediments from the eastern Sivash Lake (USSR) were analyzed for the basic components, 90 Sr and total beta activity. 90 Sr accumulated in the bt tom brine due to the formation of soluble Sr complexes as salinity increased to 6.6%. At Greater than or equal to 6.6% salinity, sulphates of Group II precipitate and carry part of 90 Sr into the sediments. Total activity is maximal in the sediments from the South Strait, whereas southward and northward, it is lower. A correlation was found between the content of SO 42- and total beta activity. --Copyright 1978, Biological Abstracts, Inc.
W78-03611

WATER MONITOR SYSTEM: PHASE I TEST REPORT,
National Aeronautics and Space Administration, Houston, TX. Lyndon E. Johnson Space Center.
R. E. Taylor, and E. L. Jeffers.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-13909. Price codes: A06 in paper copy, A01 in microfiche. Report No. NASA TM X-58179, JSC-11020, October 1976. 115 p, 27 fig, 10 tab, 11 ref, 1 append. 644-02-01-41-72.

Descriptors: *Pollutant identification, *Utilities, *Effluents, *Water quality standards, *Sampling, *Monitoring, *Waste water treatment, Waste water(Pollution), Water reuse, Analytical techniques, Chemical analysis, Bioassay, Sensors.

Wastewater recycling and reuse will become a common practice in the future. Because of spacecraft developments in these areas, NASA can contribute to solutions related to wastewater. NASA's commitment to an integrated utility system for power generation, water processing, waste management, and use of residual energy for utility functions led to a program to develop a water monitoring system (WMS). The WMS was

developed on the premise that successful reclamation in integrated utility systems or community treatment facilities is dependent on adequate and timely verification of water quality. The application of the WMS has been modestly scaled for early use as an effluent monitor in wastewater reclamation. Initially is was decided that 25 sensors would be required for effluent monitoring and that 25 parameters can provide a final water quality definition at a treatment plant outfall. This report describes the WMS, the assembly and test of a breadboard system at the Johnson Space Center, and an on-line real-time feasibility demonstration through monitoring and data collection in the wastewater treatment facility. Recommendations are to develop additional automation, reduce susceptibility to contamination, improve reliability of fluid flow to the sensors, reduce biosensor conditioning, upgrade total water quality determination, and use commercial digital incremental recorders in the data acquisition system. The final phase of the program will be system demonstration in a community wastewater treatment installation. (Wares-IPA)
W78-03663

DISCRIMINATION OF PARTICULATES FROM OIL IN CONTAMINATED WATER UTILIZING THE ANGULAR INTENSITY DISTRIBUTION OF SCATTERED LIGHT,
David W. Taylor Naval Ship Research and Development Center, Annapolis, MD.
B. Friedman.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 261, Price codes: A02 in paper copy, A01 in microfiche. Research and Development Report No. MAT-76-23, December 1976. 9 p, 6 ref. 2862-164, Task 17509.

Descriptors: *Oil wastes, *Analytical techniques, *Oil pollution, *Pollutant identification, Water pollution, Analysis, Monitoring, Mathematical studies, Mathematical models, *Light scattering technique, *Particulate discrimination, Angular intensity.

A major difficulty in the utilization of light-scattering techniques for the accurate determination of the concentration of oil in water is interference due to the presence of particulate matter. The question which this report addresses is whether or not measurements of the angular-intensity distribution of scattered light can be used to discriminate between particulates and oil in water and thus eliminate such interference. In the mathematical model studied, it was assumed that the oil present consisted predominantly of free-floating transparent spheres, that particles and spheres are illuminated by a beam composed of parallel rays of light, and that the particles and spheres are larger than a few wavelengths of the monochromatic light used. When these size conditions hold for a system of particles having a range of sizes, the combined light scattering can be treated approximately as a combination of classical diffraction and geometrical transmission and reflection, allowing computational simplification. Since both the surface of a sphere and a random assembly of irregular particle surfaces offer about equal probabilities of diffraction, reflection, and refraction, it was concluded that there is minimal chance of developing a oil-in-water monitor based only on light-scattering angular-intensity distribution measurements. (Wares-IPA)
W78-03664

TRACE ANALYSIS OF ARSENIC BY COLORIMETRY, ATOMIC ABSORPTION AND POLAROGRAPHY,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Planning.
L. H. Howe.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 652, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-036, April 1977. 37 p, 5 fig, 8 tab, 38 ref. (TVA Report E-EP-77-3). E-AP 78-BDH, EHA 553, D5-E721.

Descriptors: *Pollutant identification, *Analytical techniques, *Polarographic analysis, Analysis, Water pollution, Water sampling, Colorimetry, Arsenic compounds, Thermal powerplants, Atomic absorption.

A differential pulse polarographic method was developed for determining total arsenic concentrations in water samples from ash ponds at steam-electric generating plants. After digestion of the sample and isolation of arsenic by solvent extraction, the peak current for arsenic is measured and compared to a standard curve. The effective range of concentrations for the method is from 2 to 50 micrograms/liter of arsenic. The precision and accuracy of this polarographic method for determining concentrations of arsenic in water samples were compared to two standard methods, atomic absorption and colorimetry, for observations on replicate analyses of pure standard solutions, split samples from ash ponds, standard reference samples, and standard solutions spiked with potentially interfering elements. The three methods compared favorably for the split samples; however, results of the colorimetric method for the replicate analyses were slightly negatively biased. Analysis at three concentrations showed that arsenic content can be determined by either polarography, colorimetry, or atomic absorption. There was no significant difference at the 0.05 level among the methods for split samples. The atomic absorption and colorimetric methods are more efficient, but the polarographic method is better suited for confirmatory analysis. (Wares-IPA)
W78-03665

IDENTIFICATION OF SELECTED FEDERAL ACTIVITIES DIRECTED TO CHEMICALS OF NEAR-TERM CONCERN (BENZENE, BIS(CHLOROMETHYL) ETHER, CADMIUM, HYDROGEN SULFIDE, MERCURY, PLATINUM, POLYNUCLEAR AROMATIC HYDROCARBONS, TRICHLOROETHYLENE, TRIS (2,3-DIBROMOPROPYL), PHOSPHATE).
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 979, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA 560/4-76-007, September 1976. 15 p.

Descriptors: *Pollutant identification, *Chemicals, Research and development, *Environmental effects, Toxicity, Pollutants, Ecology, Public health, Water pollution sources, Water pollution control, Economics, Cadmium, Hydrogen sulfide, Mercury, Federal government, Pollution control technology, Benzene, Bis(Chloromethyl), Ether, Platinum, Hydrocarbons, Trichloroethylene, Tris(2,3-dibromopropyl).

On-going activities of the Office of Toxic Substances of the U.S. Environmental Protection Agency are listed with respect to selected chemicals of near-term concern. The list is intended as a guide for Federal agencies and other interested organizations. The chemical substances studies pertain to benzene, bis(chloromethyl) ether, cadmium, hydrogen sulfide, mercury, platinum, polynuclear aromatic hydrocarbons, trichloroethylene, and tris(2,3-dibromopropyl) phosphate. The types of studies reported concern general pollution aspects, health and ecological effects and environmental behavior, current and projected sources, environmental levels, exposed populations, control options, regulatory actions, attendant impacts, substitutes, related costs and economic factors, and control technology. Where available, significant activities of other organizations concerning these toxic substances are included. (Wares-IPA)
W78-03666

PESTICIDE RECOVERY STUDIES FOR EVALUATION OF DEPARTMENT OF THE ARMY PESTICIDE MONITORING PROGRAM SOIL AND SEDIMENT ANALYSIS METHODOLOGY. PART I. DETERMINATION OF PESTICIDE AND POLYCLORINATED BIPHENYL RECOVERIES FROM SOIL EXTRACTED IMMEDIATELY FOLLOWING FORTIFICATION OCTOBER-DECEMBER 1976,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
J. H. Vinopal, J. F. Suprock, and T. M. White.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 782, Price codes: A02 in paper copy, A01 in microfiche. Pesticide Monitoring Special Study No. 44-0131-77, December 1976, 18 p, 11 tab, 6 ref, 3 append. 44-0131-77.

Descriptors: *Pesticide residues, Pesticide toxicity, *Monitoring, Soil analysis, Chemical analysis, Polychlorinated biphenyls, Pollutant identification, Water pollution sources, Separation techniques, Analytical techniques, Gas chromatography, *Recovery studies, Fortification.

Evaluative details and results of pesticide and polychlorinated biphenyl (PCB) recovery studies of Army Pesticide Monitoring Program soil analysis methodology are presented. The study specifically examined recoveries from soil which was extracted immediately following fortification and then carried through routine soil transfer, cleanup, concentration, and analysis procedures. The percent recovery values for eight of the nine pesticides studied and for Aroclor 1260 were essentially quantitative, ranging from 90.0 to 107.6. The recovery data clearly indicated that pesticide losses following immediate extraction of fortified soil samples, and during subsequent transfer, cleanup, concentration, and analysis steps were minimal or nonsignificant using routine Program soil analysis methodology. The requirements for further recovery studies assessing the extractability of pesticides and PCB from field or weathered residue type soil samples and from sediment samples are discussed. The appendices present analytical methods and procedures; a summary of lower limits of instrumental sensitivity, lower limits of detectability in soil, and florisil column elution behavior for pesticides and PCB; and a summary of recovery data obtained for chlordane, oxychlordane, p,p'-DDE, malathion, beta-BHC, chlorpyrifos, p,p'-DDT, mirex, dieldrin, and Aroclor 1260 using fortification, extraction, cleanup, and gas chromatographic procedures. (Wares-IPA)
W78-03667

TRACKING POLLUTANTS FROM A DISTANCE,
Environmental Protection Agency, Las Vegas, NV. Office of Research and Development.
S. H. Melfi, J. D. Koutsandreas, and J. Moran.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 824, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/J-77-007, In: Environmental Science and Technology Vol. 11, No. 1, p. 36 - 38, January, 1977. 1HD620.

Descriptors: *Pollutants, *Pollutant identification, *Remote sensing, *Monitoring, Analytical techniques, Aerial photography, Environment, *Tracking techniques, Lasers.

Remote sensing (monitoring at a distance) is a relatively new technique that the EPA is investigating and selectively applying to track environmental pollutants. The principal advantage of remote sensing is its ability to examine the whole picture at once; it is also more cost-effective than more conventional monitoring techniques (an important consideration since resources required to perform all of the monitoring needed are unavailable). The present form and strategy of the remote sensing program is described in terms of providing opera-

tional remote sensing support and developing advanced techniques to meet critical monitoring needs. Three types of remote sensing: earth reflected differential absorption systems, airborne light detection and ranging (LIDAR) systems, and laser fluorosensing systems can be used for oxidant transport studies, plume inventories, plant siting studies, model verification, measuring inversion layer height, determining plume dimensions, positioning other monitoring platforms, supporting model efforts, characterizing oil spills, determining vegetation stress, monitoring selected water pollutants, mapping chlorophyll, and studying dye dispersion. (Wares-IPA)
W78-03670

THE FOUNDATIONS OF ORGANIC POLLUTANT ANALYSIS,
Municipal Environmental Research Lab., Cincinnati, OH.
A. A. Rosen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 309, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/J-76-033, In: 'Identification and Analysis of Organic Pollutants in Water,' L. H. Keith, Ed., Ann Arbor Science, Ann Arbor, MI, p. 3-14, December, 1976. 35 ref.

Descriptors: *Pollutant identification, *Pollutants, *Organic wastes, *Analytical techniques, Water sampling, Chemical analysis, Tracking techniques, X-ray analysis, Spectroscopy, Chromatography, Oil spills, Biodegradation, Pesticides, Detergents, Environmental effects, Carcinogens.

A retrospective view of the development of systematic analyses of organic pollutants in the environment is presented. Systematic analysis of organic pollutants began a quarter century ago with the decision to apply current methods of organic qualitative analysis to multigram amounts of mixed organic pollutants recovered from extremely large sample volumes, by carbon adsorption or liquid extraction. The available tools (classical organic chemical analysis, sensory methods, molecular complexes, x-ray diffraction, ultraviolet and infrared spectrometry, and primitive chromatography) have accomplished some landmark achievements in abatement of organic chemical pollution of water supplies. Such achievements include the foundation of oil spill source detection by passive labeling, analytical proof that forced the conversion of the detergency industry to biodegradable products, the first discovery of unforeseen pollution by chlorinated pesticides, and the first animal studies of carcinogenicity of organic water contaminants. Two principles for future progress in environmental analysis are stated: the need to apply chemical science as well as instrumentation, and the need to provide for wide area programming to allow for synergistic program effects. (Wares-IPA)
W78-03671

PROBLEM DEFINITION STUDIES ON POTENTIAL ENVIRONMENTAL POLLUTANTS II. PHYSICAL, CHEMICAL, TOXICOLOGICAL, AND BIOLOGICAL PROPERTIES OF 16 SUBSTANCES.
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 428, Price codes: A13 in paper copy, A01 in microfiche. Technical Report 7509, December 1975. Rosenblatt, D. H., Miller, T. A., Dacre, J. C., Muul, I., and Cogley, D. R., Eds. 296 p, 2 fig, 61 tab, 1 191 ref, 13 append. 3A76270A835 (PRON 48-6-60828-01-F4-QG)/00/048.

Descriptors: *Data collections, *Chemicals, *Environmental effects, *Physical properties, Chemical properties, Biological properties, Toxicity, Pollutants, Water pollution sources, Phosphorus compounds, Arsenic compounds, Mercury, Aldrin, Dieldrin, Endrin, Volatility, Solubility, Analytical techniques, Ecology, Standards, Amphibians, Birds, Fish, Invertebrates, *Toxicology, Mustard gas, Thiodiglycol, Lewisite, Chlorate salts, Wheat rust, Dicyclopentadiene, Chlordane.

This report establishes a data base of physical, chemical, toxicological, and biological properties for: mustard gas, thiodiglycol, lewisite, lewisite oxide, methylphosphonic acid, iospropyl methylphosphonate, diisopropyl methylphosphonate, chlorate salts, wheat rust, inorganic arsenic compounds, mercury and its salts, dicyclopentadiene, aldrin, dieldrin, chlordane, and endrin. A summary is also presented of pertinent information concerning physical and chemical properties, analytical methods; mammalian toxicology; ecological considerations for wildlife, birds, fish, reptiles, amphibians, invertebrates, microorganisms, and plants; and existing standards. Individual descriptions and cooresponding tables group the pollutants studied according to: volatility, water solubility, and potential for waterborne movement through soil (based on availabel information concerning solubility and chemical stability in water); selected physical properties; standard analytical methods; important mammalian toxicological properties; ecological considerations for various animal groups, microorganisms, plants, and food chain effects; and standards pertaining to allowable daily intake, maximum contaminant levels, and threshold limit values. (Wares-IPA)
W78-03672

A REVIEW OF TRACE ELEMENT STUDIES RELATED TO COAL COMBUSTION IN THE FOUR CORNERS AREA OF NEW MEXICO,
Los Alamos Scientific Lab., NM.
L. E. Wangen, and C. L. Wienke.
Available from the National Technical Information Service, Springfield, VA 22161 as LA-6401-MS, Price codes: A04 in paper copy, A01 in microfiche. Informal Report No. LA-6401-MS, UC-90i, July 1976. 53 p, 32 tab, 40 ref, 3 append. W-7405-eng-36.

Descriptors: *Trace elements, *New Mexico, *Coals, Power systems operation, Environmental effects, Soil analysis, Fly ash, Soil contamination, Wildlife, Water quality, Fluorine, Potassium, Boron, Manganese, Chlorine, Magnesium, Sulfur, Molybdenum, *Coal combustion, *Four Corners Power Plant, Ash, Flora, Selenium.

A review of trace element studies related to coal combustion in northwestern New Mexico, which particularly emphasize the potential environmental effects of the Four Corners Power Plant (FCPP) is presented. Studies in coal, power plant bottom and precipitator ash, local soils, and local surface water systems are discussed in relation to trace element mobilization and potential environmental contamination. Three previous studies undertaken to assess trace element impacts in the vicinity of the FCPP were also identified: The Southwest Energy Study, a University of Nevada-Desert Research Station Study funded by EPA, and private efforts funded by the Arizona Public Service and Utah International, Inc. with input from other interested utility and mining groups. In-plant studies on coal and ash conclude that trace elements concentrations in coal used at the FCPP are consistent with levels in other coals, with the exception of fluorine and some inorganic matrix elements which appear to be present at higher levels. Soil analyses indicate an excess of trace elements in bottom ash and local soils compared to area soils, except that fluorine and potassium appear to be depleted in local soils as compared with area soils. Appendices contain sample handling procedures and analytical techniques for coal and ash, Four Corners soil data and analytical procedures, and Four Corners water quality data. (Wares-IPA)
W78-03674

PHOTOGRAMMETRY, WATER QUALITY, SAFETY APPURTENANCES, AND SHOULDER DESIGN.
Transportation Research Board, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 332, Price codes: A00 in paper copy, A01 in microfiche. Transportation Research Record 594, 1976. 64 p, 51 fig, 17 tab, 124 ref. Wilburn, M. C., Editor.

Descriptors: *Water quality, *Safety, *Highways, Roadbanks, Road construction, Sedimentation, Erosion control, *Remote sensing, *Pollutant identification, Transportation, *Photogrammetry.

A selection of articles on photogrammetry, water quality, safety appurtenances, and highway shoulder design are presented as they relate to transportation systems design and construction. The use of oblique airphotos in environmental planning is discussed. Another paper (abridged) deals with the value of remote sensing techniques to detect the presence of atmospheric pollutants and consequently assess their environmental impact. State-of-the-art and design practice revies of paved shoulders are presented in two separate articles. Concrete safety shape research, and the results of a crash test and evaluation of a precast concrete median barrier are also presented. Other discussions include: sediment trapping efficiency of straw and hay bale barriers and gabions; impact performance of the Minnesota 1.5-m-radius plate beam guardrail; impact design of crash cushions for nonstationary barriers; full-scale tests of a modified collapsing-ring bridge rail system; tubular three beam for upgrading concrete bridge railing; dynamic tests of breakaway lighting standards by using small automobiles; change in vehicle momentum during impact with a breakaway support; and testing of breakaway supports for signs and luminaires. (Dorfman-IPA)
W78-03676

TRACE ELEMENTS IN THE TERRESTRIAL ENVIRONMENT OF A COAL-FIRED POWERHOUSE,
Du Pont de Nemours (E. I.) and Co., Aiken, SC. Savannah River Lab.
J. H. Horton, R. S. Dorsett, and R. E. Cooper.
Available from the National Technical Information Service, Springfield, VA 22161 as DP-1475, Price codes: A04 in paper copy, A01 in microfiche. Report No DP-1475, September 1977. 49 p, 23 fig, 7 tab, 33 ref, 2 append. EPA-IAGD5-B681.

Descriptors: *Trace elements, *Soil chemical properties, *Water chemistry, *Water quality, Vegetation, Groundwater, Coals, Electric power production, Ecosystems, *Pollutant identification, Pollution abatement, Fly ash, Manganese, Electrostatic precipitators, Selenium.

Estimation of the quantities of trace elements released from a coal-fired powerhouse at the Savannah River Plant, Aiken, South Carolina, prior to the addition of electrostatic precipitators, was made, after which the influence of these elements upon the surrounding terrestrial ecosystems was determined. The powerhouse operated for more than 20 years, consuming about 360 million kilograms of coal annually. Twenty-nine trace elements were measured in fly ash and in samples of soil, vegetation, and ground water collected along a 29 kilometer traverse centered on the powerhouse. These included antimony, arsenic, barium, beryllium, bromine, cadmium, cerium, cesium, chromium, cobalt, copper, europium, gallium, lanthanum, lead, manganese, mercury, molybdenum, nickel, samarium, scandium, selenium, strontium, terbium, thorium, uranium, vanadium, ytterbium, and zinc. There were statistically significant effects of the stack releases upon the concentration of barium, beryllium, copper, mercury, manganese, selenium, and strontium in soil; beryllium, cobalt, molybdenum, strontium, and vanadium in vegetation; and cobalt and manganese in ground water. Barium, mercury, strontium, and

manganese were less available to plants in fly ash than in soil; manganese in ground water and selenium in soil are the only two trace elements present in the environment in concentrations that require further consideration at present. Appendices described fly ash depositions attributable to the powerhouse studied and presented statistical regression and correlation analyses. (Wares-IPA)
W78-03677

INFLUENCE OF THE SEDIMENT/WATER INTERFACE ON THE AQUATIC CHEMISTRY OF HEAVY METALS,
New England Aquarium, Boston, MA.
For primary bibliographic entry see Field 5B.
W78-03678

REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES, 1976 EDITION.
National Inst. for Ocupational Safety and Health, Rockville, MD.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 295, Price codes: A99 in paper copy, A01 in microfiche. Report No NIOSH-76-191, June 1976. 2 Parts. 1,353 p, 2 fig, 5 tab, 871 ref, 9 append. 210-75-0034.

Descriptors: *Pollutant identification, *Data collections, Information exchange, Toxicity, Chemicals, Chemical properties, Public health, Biological properties, Aquatic habitats, Environment, Hazards, Chemical analysis, Safety, Legislation, *Occupational safety and health, Biomedical measurement, Dosage.

The 1976 edition of the Registry of Toxic Effects of Chemical Substances supercedes the 1975 edition of the Registry, formerly referred to as the Toxic Substances List, and is prepared annually by the National Institute for Occupational Safety and Health (NIOSH) in compliance with the Occupational Safety and Health Act of 1970. The Registry provides basic information on the known toxic and biological effects of chemical substances for use by physicians, industrial hygienists, toxicologists, researchers, and others concerned with safe handling of chemicals. However, the absence of a substance from the Registry does not indicate that it is not toxic, and drugs or therapeutic chemicals in the Registry have been included only if they have been reported to produce a noxious effect. The 1976 Registry contains 82,908 listings of chemical substances, (5,228 more than the 1975 edition). The information given on each substance includes prime name, chemical abstracts service registry number, molecular weight, molecular formula, Wiswesser line notation, synonyms, toxic dose data, cited references, aquatic toxicity, reviews, standards and regulations, and reference to NIOSH criteria documents. Appendices to the Registry contain information on occupational safety and health standards, standards completion program analytical methods, the standard for an occupational exposure to asbestos, occupational safety and health standards for carcinogens, the standards for occupational exposure to vinyl chloride, worker protection standards for agricultural pesticides, description of the NIOSH criteria documentation program, requests for health hazards evaluation, and material on aquatic toxicity. (Wares-IPA)
W78-03679

THE RELATIONSHIP BETWEEN THE BORON CONCENTRATION OF EAST LANSING MUNICIPAL WASTEWATER AND RETENTION TIME THROUGH THE MICHIGAN STATE UNIVERSITY WATER QUALITY MANAGEMENT PROJECT UNDER CONTINUOUS FLOW CONDITIONS,
Michigan State Univ., East Lansing. Inst. of Water Research.
P. E. Duranceau, and F. M. D'Itri.
Available from National Technical Information Service, Springfield, VA 22161 as PB-263 774, Price codes: A10 in paper copy, A01 in microfiche. Report No. MSU-IWR-TR-76-0044, June 1976. 210 p, 31 fig, 5 tab, 70 ref, 35 append.

Descriptors: *Boron, Water quality, Water quality control, Sampling, Sewage effluents, Water pollution sources, Sewage treatment, Sedimentation, Algae, Sludge, Wells, Lakes, Running waters, Streams, Michigan, *Waste water treatment, *Pollutant identification, *Water quality management projects.

The fate of boron in East Lansing, Michigan municipal wastewater was determined as it moved through the Michigan State University Water Quality Management Project, in which sewage effluent in four man-made lakes was treated. The boron concentration was monitored at the sewage plant and at each of the lakes, and two streams connected with the project were checked periodically. Wells of varying depth were dug on the site and the boron levels of these were monitored. Algae, sediment, and sludge samples were taken, and the boron content determined. Results confirmed that conventional sewage plants do not remove boron. The concentration was constant through the plant, and the load in kg/day did not change. The amount of boron ranged from 0.1 to 0.5 mg/l, depending on the precipitation and flow rate. Sewage sludge contained from 28 to 84 ppm boron. The stream receiving discharge from Lake 4 had increasing levels of boron, and both streams showed evidence of contamination from poultry waste deposited in the area during times of heavy rainfall. The boron content of shallow wells did not change, but the boron content of the deepest wells increased over time to the levels of the shallow wells. The uptake of boron was not significant enough to change the boron/chlorine ratio of the water masses. Available boron of sediments increased over time, especially during the growing season. Boron was not being removed by the sewage treatment process, and there was no evidence of boron adsorption onto the sewage sludge. Sampling data and results are presented in the appendices. (Wares-IPA)
W78-03680

ASBESTOS FIBERS IN DISCHARGES FROM SELECTED MINING AND MILLING ACTIVITIES. FINAL REPORT PART III,
McCrone (Walter C.) Associates, Inc., Chicago, IL.
I. M. Stewart, R. E. Putscher, H. J. Humecki, and R. J. Shimps.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 288, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-560/6-77-001, January 1977. 44 p, 3 fig, 10 tab, 6 append. EPA-68-01-2690.

Descriptors: *Asbestos, *Pollutant identification, *Mine wastes, Water pollution sources, Copper, Gold, Effluents, Vermont, New York, California, Arizona, Montana, South Dakota, Environmental gradient, *Path of pollutants, Vermiculite, Talc.

Results of the analyses of water from point sources associated with the mining and milling of potentially asbestos bearing rocks are presented as a portion of a nationwide survey to determine the impact of point and non-point sources on levels of water-borne asbestos. Water samples were taken in and near six mining and milling operations in which the presence of asbestos minerals was suspected. Filtered samples were examined and analyzed in a combined electron microscope microanalyzer, repeating with samples selected at random as a check on reproducibility. All the locations sampled showed asbestos fibers in their effluent except at the Arizona copper mine. Waste water is recycled and not discharged at the California and Montana facilities. Findings showed that a variety of mineral ore types may have asbestos minerals associated with them and that these fibers are liberated into their effluents; and in some instances, however, the final effluent has little impact on asbestos fiber levels in the local surface water which already has high asbestos content. (Wares-IPA)
W78-03687

5B. Sources Of Pollution

ANAEROBIC PROCESSES, (LITERATURE REVIEW),
Institute of Gas Technology, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-03218

AQUATIC DISPOSAL OF DREDGED MATERIAL: RELEASE OF CONTAMINANTS DURING AND AFTER DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
R. M. Engler.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 220-235, December 1976. 23 ref.

Descriptors: *Dredging, *Disposal, *Aquatic environment, *Investigations, Navigable waters, Programs, Water quality, Turbidity, Sediments, Wastes, Water pollution, Environmental effects, Reviews, Estuaries, Coasts, Rivers, *Dredged Material Research Program.

The Corps of Engineers was authorized by Congress in the 1970 River and Harbor Act to initiate a comprehensive nationwide study to provide more definitive information on the environmental impact of dredging and dredged material disposal operations and to develop new or improved dredged material disposal practices. It was concluded from studies to date (1975) that: (1) The field evaluations are verifying results demonstrated in the laboratory investigations. (2) Water column impact during disposal appears minimal to nonexistent, and effect is predominately aesthetic in nature. (3) Leaching of toxic heavy metals from the disposal mound into the water column appears no greater than from natural sediments of similar geologic character. Chlorinated hydrocarbon release was not detected. Nutrients were released to small concentrations greater than background. (4) The major bottom impact found at disposal sites was the physical mounding of the material. Benthic recolonization of the mounds appears relatively rapid. (5) 'Bulk' or total sediment analysis does not relate to any mobile or bio-available fraction of a sediment, nor can it predict or evaluate water quality and ecological perturbations. (6) Water quality criteria and bioassay were developed for Public Law 92-500 and 92-532 and are being field-verified. (7) Toxic heavy metal uptake studies are incomplete, but initial trends suggest minimal to no impact in marine and estuarine sediments. (8) Petroleum and chlorinated hydrocarbon uptake studies are incomplete at this time; however, initial trends suggest minimal uptake from solid phase of sediments. (See also W78-09325) (Humphreys-ISWS)
W78-03234

MODELING OF OIL EVAPORATION IN AQUEOUS ENVIRONMENT,
Technische Univ., Brunswick (West Germany). Leichtweiss Inst. for Water Research.
For primary bibliographic entry see Field 2D.
W78-03244

HEAVY METAL SEDIMENTATION IN SAANICH INLET MEASURED WITH 210PB TECHNIQUE,
Department of the Environment, Victoria (British Columbia). Ocean Chemistry Div.
E. Matsumoto, and C. S. Wong.

Journal of Geophysical Research, Vol. 82, No. 34, p 5477-5482, November 20, 1977. 4 fig, 4 tab, 24 ref.

Descriptors: *Sediments, *Canada, *Heavy metals, *Sedimentation rates, Sampling, Estuaries, Inlets(Waterways), Chemical analysis, Chemicals, Lead, Copper, Cadmium, Mercury, Core drilling, Core logging, On-site data collections, Model studies, Mathematical models, Sedimentology, Water pollution sources, *Saanich Inlet(British Columbia).

Two undisturbed sediment cores at 220 and 200 m in the deepest basin of Saanich Inlet, British Columbia, were collected by a box corer. In the upper 30 cm, the sediment porosity exhibited an abrupt decrease with depth due to compaction. The corrected depth of sediments without compaction was calculated. The 210Pb profiles were plotted against the corrected depth in order to determine the accumulation rate at the surface in cm/yr. The sedimentation rate in g/sq cm/yr was calculated from the accumulation rate. A sedimentation rate of 0.093 g/sq cm/yr was obtained at the end of the deep basin awar from the sill entrance and 0.27 g/sq cm/yr near the sill of the deep basin. The Pb, Cu, Cd, and Hg contents in the sediment cores appeared to decrease with depth. A present metal flux of 1.9-5.1 dpm/sq cm/yr was inferred for 210Pb, 3.6-11 micrograms/sq cm/yr for stable Pb, 6.3-14 for Cu, 0.11-0.48 for Cd, and 0.029-0.072 for Hg. When some recent measurements of heavy metal concentrations in the seawater near the sill of the deep basin of Saanich Inlet were used, a residence time in the water column of 0.08 years was inferred for 210Pb, 0.07 for stable Pb, 0.3 for Cu, 3 for Cd, and 2 for Hg. (Sims-ISWS)
W78-03245

PB210-DETERMINED SEDIMENTATION RATE, AND ACCUMULATION OF METALS IN SEDIMENTS AT A STATION IN CHESAPEAKE BAY,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
J. R. Schubel, and D. J. Hirschberg.
Chesapeake Science, Vol. 18, No. 4, p 379-382, December 1977. 4 fig, 1 tab, 11 ref.

Descriptors: *Sedimentation rates, *Lead radioisotopes, *Chesapeake Bay, *Sedimentation, *Chemical analysis, *Deposition(Sediments), Lead, Heavy metals, Analytical techniques, Sediments, Estuaries, Tagging, Water chemistry, Radioisotopes, Oceanography, Nickel, Copper, Chromium, *Pollutant identification, Path of pollutants, *Radiometric measurements, *Sediment deposition, *Tilghman Island, Geochemical analysis, Radiochemical analysis, Organic carbon.

This paper contained the first published radiometrically determined comtemporary sedimentation rate, a rate characteristic of the past few decades, for any part of the Chesapeake Bay estuarine system. Cores collected from a station in the main body of the Chesapeake Bay off Tilghman Island (38 deg 41 min 30 sec N, 76 deg 24 min 00 sec W) were analyzed for Pb210, organic carbon, nitrogen, and selected metals. A mean sedimentation rate of between 0.09-0.12 cm/y was inferred from the Pb210 data. The distributions of C and N are typical of many areas of the Bay. The distributions of extractable Ni, Cr, Cu, and Pb increased in the upper 10-15 cm of the core. The increases in metal concentrations over the past century or so may be a result of man's activities. (Henley-ISWS)
W78-03247

OBSERVATIONS OF THE MIXING IN THE BALTIC THERMO- AND HALOCLINE LAYERS,
Copenhagen Univ., Denmark. Inst. of Physical Oceanography.
G. E. B. Kullenberg.
Tellus, Vol. 29, No. 6, p 572-587, December 1977. 6 fig, 5 tab, 32 ref.

Descriptors: *Path of pollutants, *Mixing, *Dissolved oxygen, *Diffusion, On-site investigations, Dye releases, Dye dispersion, Winds, Salinity, Temperature, Water temperature, Thermocline, Stability, Data processing, Oceans, Oceanography, *Baltic Sea, Halocline.

The vertical and horizontal mixing of a passive contaminant in the Baltic thermo- and halocline layer was investigated in a series of experiments during spring and fall. It was found that the vertical mixing is very weak. The horizontal spreading is a factor of 2-5 lower than in the surface layer. The integrated vertical transfer across the halocline layer is of the same order of magnitude as the integrated transfer in the coastal boundary zone. It was found that the wind is an essential source of energy for the mixing. The significance of the wind-forcing was demonstrated by the correlation between the fluctuations of the wind and (1) the fluctuations of the oxygen content in the deep water, and (2) the fluctuations of the stability across the halocline layer during the present century. The results supported the view that the overall decrease of the oxygen content in the deep waters is due to other factors than an alteration of water exchange characteristics. (Sims-ISWS)
W78-03254

DREDGED SEDIMENT MOVEMENT TRACING IN SAN FRANCISCO BAY UTILIZING NEUTRON ACTIVATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Weapons Effects Lab.
E. J. Leahy, W. B. Lane, T. M. Tami, L. B. Inman, and W. R. McLoud.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 844, Price codes: A06 in paper copy, A01 in microfiche. Technical Report N-76-1, June 1976. 25 fig, 13 tab, 10 ref, 1 append.

Descriptors: *Dredging, *Tracers, *California, *Sediments, Sampling, Spoil banks, Bays, Estuaries, Sediment transport, Dispersion, Sediment distribution, Deposition(Sediments), Channel improvement, Neutron activation analysis, Spectroscopy, Irradiation, Data processing, Analytical techniques, Sedimentology, *San Francisco Bay, Iridium, Dredged materials, Dredged material disposal.

The movement and circulation of sediments in San Francisco Bay result from the complex interactions of tidal flows, wind-wave resuspension and recirculation and variations of freshet conditions with associated sediment loads, stratification, and shifting of nodal point. This complex system is currently beyond the modeling capability of mathematical and physical hydraulic models. Thus, a program was instituted to trace physically the movement of dredged materials with the objective of quantifying the horizontal and vertical recirculation of the dredged sediment. Tracing was accomplished by tagging Bay sediments with the chemical element iridium, neutron-activating sediment samples collected from an extensive test area, and using gamm-ray spectrometry to determine the quantity of iridium and hence the amount of dredged material present. The program was successful and permitted tracing the movement of the dredged material for a period of 10 months after the introduction of traced sediments in February-March 1974 until the completion of sampling in December 1974. The Tracer Program showed that material dredged from Mare Island Strait and released at the Carquinez Strait disposal site is distributed both spatially and with depth in bottom sediments over most of the region sampled. Initial dispersion is fast, and resuspension seems to occur continuously. A portion of the dredged material is transported back to the original dredged channel. Upon redredging of the channel in September 1974, the traced sediments from the original tracing operation were detected in the study area. A general conclusion was that the movement of dredged sediments is probably more than complex than originally anticipated. (Sims-ISWS)
W78-03257

A HYDROPONIC STUDY OF HEAVY METAL UPTAKE BY SELECTED MARSH PLANT SPECIES,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 2I.
W78-03258

SELECTED ASPECTS OF THE CONTROL OF TOXIC SUBSTANCES (A COMPILATION OF SPEECHES), BY THE MEMBERS OF THE STAFF OF THE OFFICE OF TOXIC SUBSTANCES.
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W78-03263

FOREST VEGETATION AS A SOURCE OF BIOGENIC AND ORGANIC SUBSTANCES IN NATURAL INLAND WATERS,
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
Y. G. Maystrenko, A. I. Denisova, and G. A. Yenaki.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 418, Price codes: A02 in paper copy, A01 in microfiche. Translated from Gidrobiologicheskiy Zhurnal, Vol. 4, No. 5, 1968. Army Cold Regions Research and Engineering Laboratory, Hanover, NH, Draft Translation 608, March 1977. 13 p, 2 fig, 2 tab, 19 ref.

Descriptors: *Inland waterways, *Forest watersheds, Vegetation, Coniferous forests, Deciduous forests, *Water pollution, Degradation(Decomposition), Chemical analysis, Wood wastes, Water pollution sources, Reservoirs, *Kiev Reservoir, Trees, USSR.

Data were collected with regard to the relative rate of release of biogenic and organic substances from flooded forest vegetation and their accumulation in water. The rate of incursion into the water medium of such substances from willow, poplar, maple, and pine trees that had been flooded was determined in a laboratory setting. Wood was placed and secured in large glass vessels, with water level kept constant by adding water from the Kiev Reservoir at the rate of natural water turnover. The ratio of wood to water was 1:100, and exposure was maintained for 300 days at 17 to 23 degrees Centigrade. Determinations were made of the content of organic carbon, nitrogen, phosphorus, permanganate and bichromate oxidizabilities, color index, free amino acids, reducing sugars, phenols, pH, oxygen, carbon dioxide, mineral forms of nitrogen and phosphorus, suspended and solute phosphates, and suspended and solute iron and silicon. These same constituents were also determined in natural water (control) from the same reservoir. Results showed that the leaf bearing trees (willow, poplar, and maple) created greater concentrations of substances in water (especially organic and ammonium nitrogen phosphorus, carbohydrates, and amino acids) than did coniferous trees (pine). The data obtained can be used when predicting the conditions of new and existing water basins. (Wares-IPA)
W78-03265

NONPOINT SOURCE CONTROL GUIDANCE CONSTRUCTION ACTIVITIES,
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
For primary bibliographic entry see Field 5G.
W78-03268

A TEST PARTICLE DISPERSION STUDY IN MASSACHUSETTS BAY.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 434, Price codes: A04 in paper copy, A01 in microfiche. Technical Report ERL 374-MESA 6, September 1976. 56 p, 13 fig, 2 tab, 10 ref, 10 append. Wing, R. H. (Ed.).

Descriptors: *Dispersion, *Sediment transport, *Resources development, *Baseline studies, Massachusetts, Meteorological data, Mathematical models, Dredging, Environmental effects, *Outer Continental shelf, Environmental impact, Dredging operations, Oceanographic data, Particle dispersion, *Massachusetts Bay.

The goal of this study was to develop a predictive model to estimate, in advance of dredging operations, where the fines of a dredge plume would travel. On June 11, 1973, 2700 kg (3 tons) of small particles were released into the water column in Massachusetts Bay. Their movement was tracked for 10 days. Also, oceanographic data were collected and analyzed and a dispersion model was formulated. Final data show the plume movement to be westward toward Boston Harbor, eastward toward Stellwagen Bank and southward along the coast into Cape Cod Bay where a counterclockwise gyre is suggested. (Sinha-OEIS)
W78-03270

A PILOT STUDY ON THE DESIGN OF A PETROLEUM HYDROCARBON BASELINE INVESTIGATION FOR NORTHERN PUGET SOUND AND STRAIT OF JUAN DE FUCA,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
W. D. MacLeod, D. W. Brown, R. G. Jenkins, L. S. Ramos, and V. D. Henry.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 276, Price codes: A04 in paper copy, A01 in microfiche. Technical Memorandum ERL MESA-8, November 1976. 60 p, 18 fig, 12 tab, 11 ref, 2 append.

Descriptors: *Baseline studies, *Environmental effects, *Water pollution effects, *Coasts, *Oil pollution, *Bioindicators, Sediments, Biota, Mussels, Snails, Analytical techniques, *Puget Sound, Strait of Juan de Fuca, Outer Continental Shelf, Petroleum hydrocarbons, Residual hydrocarbons, Environmental Impact.

Substantially increased petroleum tanker traffic, pipeline transport, and refining operations are anticipated in the region of Northern Puget Sound and Strait of Juan de Fuca when the Alaska pipeline comes into operation. To assess the potential future environmental impact arising from these activities current hydrocarbon baseline levels must be measured. This report presents the results of the pilot study and offers recommendations for a first year Petroleum Hydrocarbon Baseline Investigation. The pilot study has demonstrated that methodology exists to detect and measure a number of hydrocarbons in sediment, mussels (Mytilus edulis and Mytilus californianus), and a snail (Thaie lamellosa). Appendices identify critical intertidal sites for further study and recommends analytical procedures best suited to the particular environment. (Sinha-OEIS)
W78-03271

APPLICATION OF ESTIMATION THEORY TO DESIGN OF SAMPLING PROGRAMS FOR VERIFICATION OF COASTAL DISPERSION PREDICTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
R. De Guida, J. J. Connor, and B. Pearce.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 413, Price codes: A03 in paper copy, A01 in microfiche. Sea Grant Report No. MITSG-76-16, November 20, 1976. 36 p, 11 fig, 15 ref. SG-04-5-158-1.

Descriptors: *Path of pollutants, *Pollutant identification, *Sampling, *Dispersion, Pollutants, *Mathematical models, Water pollution sources, Monitoring, Coasts, Finite element analysis, Water resources, Environmental impact, Estimation theory, *Kalman-Bucy filtering.

The analytical framework for applying Kalman-Bucy filtering to dispersion in a coastal water body is developed. Particular emphasis is placed on quantification of the model uncertainty due to model parameters, source loadings, and velocity fields. The formulation is discretized with the Finite Element Method, and a number of comparison studies are presented. (Sinha-OEIS)
W78-03275

NUMERICAL MODELING OF DISPERSION IN STRATIFIED WATERS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
G. Christodoulou, and J. J. Connor.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 379, Price codes: A02 in paper copy, A01 in microfiche. Sea Grant Technical Report No. MITSG-76-17, Index No. 76-317-Cbc, November 20, 1976. 24 p, 11 fig, 1 tab, 16 ref. SG-04-6-158-44007.

Descriptors: *Mathematical models, *Dispersion, *Coasts, Massachusetts, Stratification, Themocline, *Path of pollutants, Water pollution sources, *Massachusetts, Particle dispersion.

A numerical model is developed for the quantitative description of the dispersion process in a two-layer system which represents an approximation for a natural coastal water body during the summer season when a distinct thermocline usually exists. The formulation is based on the convection-diffusion equation, vertically integrated between the layer boundaries. Layer velocities and thickness are assumed to be obtained from a separate hydrodynamic model. The quantification of the physical processes of entrainment and mixing through the density interface as well as the horizontal dispersion mechanism is discussed. The model is applied to a particle dispersion experiment carried out recently in the Massachusetts Bay and comparisons with field data are presented. (Sinha-OEIS)
W78-03278

DETERMINATION OF THE ATMOSPHERIC CONTRIBUTION OF PETROLEUM HYDROCARBONS TO THE OCEANS,
World Meteorological Organization, Geneva, (Switzerland).
W. D. Garrett, and V. M. Smagin.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-18609, Price codes: A03 in paper copy, A01 in microfiche. Special Environmental Report No. 6, WMO-No. 440, 1976. 37 p, 4 fig, 5 tab, 60 ref.

Descriptors: *Oil pollution, *Air-water interfaces, *Environmental effects, Evaporation, Water pollution sources, Petroleum hydrocarbons, Air-sea interaction, Film spreading.

The existing knowledge concerning petroleum hydrocarbons in the marine atmosphere and procedures by which their flux from air to sea may be determined is reviewed. A sampling and analytical program is recommended in order to assess the atmospheric contribution of petroleum. The possibilities of air-sea interfacial alterations by petroleum films which could influence geophysical processes and climate are discussed to some extent. Preliminary estimation has been made for the sea-to-air flux of petroleum hydrocarbons. The recommended sampling and analysis scheme for determination of the flux of petroleum hydrocarbons at the air-sea interface will be composed of three parts and require both land and sea stations. The three phases of the program include air sampling, sea surface sampling and the collection of precipitation and dry fallout. Sophisticated analytical techniques and highly trained technicians and scientists are required because of the following task difficulties: expected low concentrations of hydrocarbons; high probability of sample contamination from a number of sources; and the need to distinguish between petroleum and biogenic forms of hydrocarbons. These factors will require relatively expensive equipment and personnel, so that sampling sites must be carefully selected to provide, at a reasonable cost, the maximum information without redundancy. (Sinha-OEIS)
W78-03285

THE PHYSICAL OCEANOGRAPHY AND WATER QUALITY OF NEW YORK HARBOR AND WESTERN LONG ISLAND SOUND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
D. A. Jay, and M. J. Bowman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 632, Price codes: A05 in paper copy, A01 in microfiche. Technical Report No. 23, Reference No. 75-7, December 1975. 76 p, 21 fig, 9 tab, 110 ref, 3 append.

Descriptors: *Water quality, *Sewage effluents, *Water pollution sources, *Estuarine environment, *Transport, Salinity, Pollutants, New York, Water resources, Waste disposal, Environmental effects, *New York Harbor, *Long Island Sound, New York Bight, Outer Continental Shelf, Ocean dumping, Physical oceanography.

The literature on the tides, currents, hydrography and hydrology of New York Harbor from 1848 to date is reviewed. Particular emphasis is placed on the relationship between water, salt and pollutant transport mechanisms in the East River, the Harbor and western Long Island Sound. An estuarine circulation in the Upper East River modifies the hydraulic regime and transports Upper East River surface water toward Long Island Sound. The observed distributions of nutrients and sewage effluents suggest that the estuarine and dispersive mechanisms in the East River transport a considerable fraction of sewage emptied into the East river to the Sound, while the advective component is expected to transport effluents into New York Harbor. Transport of sewage pollutants from the East River is probably a major factor causing the observed violations of state and federal water quality standards in western Long Island Sound. It is concluded that the East River, particularly the upper section, is a very poor location to release sewage effluents. (Sinha-OEIS)
W78-03286

BARATARIA BASIN: BIOLOGICAL CHARACTERIZATION,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W78-03289

LOADING OF PROCESS WATER BY DISSOLVED SUBSTANCES DURING PAPER MANUFACTURE. I. SURVEY OF STONE GROUNDWOOD PRODUCTION (UEBER DIE DURCH GELOESTE SUBSTANZEN VERURSACHTE BELASTUNG DES FABRIKATIONSWASSERS BEI DER PAPIERHERSTELLUNG. I. BESTANDSAUFNAHME BEI DER ERZEUGUNG VON STEINSCHLIFF),
Technische Univ., Darmstadt (West Germany). Inst. fuer Paperfabrikation.

L. Gottsching, W. Luttgen, and H. -L. Dalpke.
Das Papier, Vol 31, No 7, p 257-263, July, 1977. 3 fig, 6 ref, 4 tab. English summary.

Descriptors: *Pulp wastes, *Organic compounds, *Pollutants, *Inorganic compounds, Water pollution sources, Wastes, Industrial wastes, Chemical oxygen demand, Biochemical oxygen demand, Organic loading, Groundwood mills.

The characteristics arising from dissolved inorganic and organic substances in effluents from various industrial groundwood mills and from a pilot plant for producing stone groundwood are given. The pollutant load is indicated by concentration, specific initial COD, and specific initial BOD. The specific initial COD of dissolved substances is related to the value obtained from the fibrous material in order to evaluate the reduction in yield resulting from dissolution of woody material. Differences between the specific initial BOD values from the different groundwood mills are attributed to differences in preloading of the shower waters. The original COD load in pilot-plant grinding is related to the temperature of the groundwood suspension in the grinder pit. (Ward-IPC)
W78-03296

DIFFICULTY DECOMPOSED TOXIC SUBSTANCES FROM THE PULP AND PAPER INDUSTRY (SVARNEDBRYTBARA, TOXISKA AMNEN FRAN PAPPERS- OCH CELLULOSAINDUSTRIN),
Institutet for Vatten- och Luftvardsforskning, Stockholm (Sweden).
For primary bibliographic entry see Field 5C.
W78-03306

COMPOSITION OF SPRUCE SULFATE PULP BLEACHING EFFLUENTS (ZLOZENIE ODPADOVYCH VOD Z BIELENIA SMREKOVEJ SULFATOVEJ BUNICINY),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5A.
W78-03309

EFFECTS OF BLEACH PLANT EFFLUENTS FROM SULFATE PULP BLEACHING ON GROWTH AND PHOTOSYNTHESIS OF PLANKTONIC ALGAE (EFFEKTER AV BLEKERIAVLUTAR FRAN SULFATMASSABLEKNING PA TILLVAXT OCH FOTOSYNTES AV PLANKTISKA ALGER),
Institutet for Vatten- och Luftvardsforskning, Stockholm (Sweden).
For primary bibliographic entry see Field 5C.
W78-03316

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT (VOLUME I-TEXT).
Forest Service (USDA), Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 280, Price codes: A08 in paper copy, A01 in microfiche. Report No. EPA-600/3-77-036, April 1977. 145 p, 2 fig, 14 tab, 560 ref. 1HB617, EPA-IAG-D5-0660.

Descriptors: *Forecasting, *Water pollution sources, *Watershed management, Hydrologic cycle, Sediments, Pollutants, Model studies, Water quality control, *Wildland, Nonpoint pollution.

Three main areas are handled in an examination of non-point source pollution: mangement activity/pollutant relationship, predictive model review and state-of-the-art assessment, and an inventory of 176 wildland watersheds suitable for model validation and development. Non-point pollution is directly related to the time and space variability of the hydrologic cycle and existing terrain; furthermore, the relationship is site dependent. Impact of sedimentation from site disturbance is most common. Predictive models for non-point pollutant loading, relating spatial variability and diversity of terrain to management activities, are the most important in evaluating the potential on-site impact of planned wildland management activities. Few non-point loading models exist. The state-of-the-art is represented by process simulation models, not yet extensively used for field application. Their use will require validation and simplification. Modular model development will have the maximum utility in the decision process. The state-of-the-art at the field level lags behind that of research and is represented by regional regression models and analytical procedures. Watersheds available for non-point model validation and testing do not have long data records (less than 10 years) except on stream flow and to a lesser extent on suspended sediment. Criteria for a predictive non-point water quality model include: modular structure within comprehensive framework, ability to predict pollutant parameter loading of all orders of streams, facilitation of comparative evaluation control or management alternatives, representation of time and probability variables, representation of spatial variability of conditions and activities, and incorporation of available knowledge for use by field level scientists in the decision-making process. (Wares-IPA)
W78-03417

MERCURY DISTRIBUTION IN SOIL AROUND A LARGE COAL-FIRED POWER PLANT,
Environmental Monitoring and Support Lab., Las Vegas, NV. Monitoring Systems Research and Development Div.
A. B. Crockett, and R. R. Kinnison.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 289, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/3-77-063, May 1977. 16 p, 2 fig, 1 tab, 17 ref. 1HDo20.

Descriptors: *Mercury, *Soil contamination, *Sampling, Air pollution, Electric power production, Coals, Water pollution sources, *Path of pollutants, Distribution, *Residues, Emissions, Power plants, Atomic absorption spectrophotometry, Four Corners(New Mexico).

Mercury distribution in the soil around the Four Corners, New Mexico coal-fired power plant was determined from 70 soil samples collected on a radial grid employing 16 evenly spaced radii and five logarithmically spaced concentric circles around the plant within 30 km of the plant. Samples were analyzed for total mercury using a Zeeman Atomic Absorption spectrophotometer. Residue levels were quite low compared to average soil residues, and no statistically valid differences in mercury residue levels were detected between circles or radii using two-way analysis of variance techniques. Since the program could not accommodate missing samples, six of the radii were dropped from the data analysis. F-ratios on the ten remaining radii indicated significant differences between circles, significant differences between radii, and significant complex interaction; attempts to subdivide the data did not successfully eliminate the interaction effects. Contours of isomercury concentrations showed a relative high west of the plant near the ash ponds and another just east of the plant. The fate of the 510 kg of mercury emitted per year is unknown, but it is not accumulating significantly within 30 km of the plant. Mercury emissions from U.S. coal-fired power plants amount to only 4% of the natural degassing loss in the U.S., and levels near power plants appear low. The significance of mercury emissions by power plants should be evaluated on a regional basis since evidence shows no significant local elevation of mercury in soils or air. (Wares-IPA)
W78-03418

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON NITROGEN TRANSPORMATIONS IN SOIL,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 5E.
W78-03424

MONITORING HEAVY METALS AND PESTICIDES IN THE CAPE FEAR RIVER BASIN OF NORTH CAROLINA,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5A.
W78-03426

EXTENSIVE DEGRADATION OF SILVEX BY SYNERGISTIC ACTION OF AQUATIC MICROORGANISMS,
Syracuse Univ. Research Corp., NY.
H. C. Sikka, and L. T. Lu.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 101-105, December 1976. 1 fig, 15 ref. DACW 36-74-C-0068.

Descriptors: *Herbicides, *Microbial degradation, *Pseudomonas, *2,4,5-T, *Laboratory tests, *Silvex, *Achromobacter, Pesticide residues, Aquatic weed control, Degradation(Decomposition), Bacteria, Synergism.

Although the herbicide silvex had been considered very resistent to microbial degradation, a study shows it is extensively degraded by the synergistic action of two aquatic bacteria, Pseudomonas sp. and Achromobacter sp. It was also observed tht these microorganisms are able to disrupt the aromatic ring of 2,4,5-T, another recalcitrant herbicide. Neither bacteria incubated alone with the herbicide was able to degrade it, nor did an artificial mixture of the two organisms degrade silvex or 2,4,5-TCP; only when they were grown together on the agar plate were they able to degrade the chemicals. Although no explanation for this phenomenon is offered at present, it is felt that the organisms undergo some changes during their isolation from the mixed culture which results in their inability to metabolize silvex or 2,4,5-TCP. The mixed culture of Pseudomonas and Achromobacter could not use silvex as the sole carbon source, but did metabolize the herbicide in the presence of an external carbon source such as yeast extract. The mixed culture was grown in a mineral medium containing 0.2% yeast extract and 300 ppm silvex on a rotary shaker at 23C. (See also W78-03429) (Lynch-Wisconsin)
W78-03437

2,4-D IN SLOW-MOVING WATER,
University of Southwester Louisiana, Lafayette. Dept. of Plant Industry.
J. R. Barry.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 94-100, December 1976. 2 fig, 4 tab. DACW 39-74-C-0074.

Descriptors: *2,4-D, *Herbicides, *Pesticide residues, *Aquatic weed control, *Flow rates, Streamflow, Louisiana, Canals, Water pollution, Pollutants, Application rates, Flow characteristics, Slow-moving waters.

In tests of residue levels after application of the herbicide 2,4-D to six slowly-moving lateral canals near Milton, Louisiana, concentrations at various downstream locations and times were not significantly different and did not approach 0.1 ppm, the limit for potable water supply. Each canal extends at least 6.4 km, and each is fed by the same main canal. Average surface velocity varies from 0.1-0.32 m/sec, and average stream velocity is 0.0557-0.182 m/sec. Five canals were sprayed on opposite sides in strips 166 m long by 3 m wide (0.6 m on the bank and 2.4 m into the stream); at canal 5, a 0.2-ha

area was sprayed from bank to bank (but only on the water). Application rates were 1.82 kg ai/ha at three canals and 3.63 kg ai/ha at the other three, including canal 5. Water samples of .75 liters were taken at .5-48 hrs after application, at eight sites on each canal: above application site, at site, and .0915, .403, .805, 1.6, 3.2, and 6.4 km below lower end of site. While theoretical 2,4-D levels in all canals exceeded the 0.1 ppm limit, water sample analyses showed averages well below 0.1 ppm. Although highest 2,4-D levels were expected at the application site or just below, these levels were not statistically different from locations above the site or well downstream. Dilution, absorption by plants or silt particles (filtered out), or less than ideal sampling sites may account for anomalies in the results. (See also W78-03429) (Lynch-Wisconsin)
W78-03442

THE STRUCTURE OF THE SPRING THERMAL BAR IN LAKE SUPERIOR, II,
Michigan Technological Univ., Houghton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 2H.
W78-03447

EFFECT OF VEGETATION ON LANDFILL STABILIZATION,
Auburn Univ., AL. Dept. of Civil Engineering.
F. J. Molz, and V. D. Browning.
Ground Water, Vol 15, No 6 p 409-415, November-December 1977. 8 fig, 2 tab, 20 ref. OWRT B-048-ALA(2), A-051-ALA(1).

Descriptors: *Landfills, *Vegetation effects, *Leachate, Lysimeters, Vegetation, Grasses, Trees, Effects, Pollutants, Evapotranspiration, Stabilization, Solid wastes, Waste disposal, Water pollution, Chemical oxygen demand, Groundwater, Path of pollutants.

Six types of vegetation were established successfully on lysimeters containing sanitary landfill materials. The vegetation grew well, with the roots penetrating several refuse layers within one year. Leachate analysis indicated that vegetation and evapotranspiration reduced leachate volume and increased the rate of refuse decomposition. This was accompanied by production of a more potent leachate and a substantial increase in cumulative chemical oxygen demand. Therefore, this study suggested more potential groundwater pollution in a shorter period of time when vegetation is planted on a landfill. The net effect of evapotranspiration on the stabilization of any particular landfill will be the result of a complex interaction involving climate, vegetation, soil type, cover material, landfill geometry, and other variables. This makes extrapolation of these results to a particular field situation rather difficult. (Sims-ISWS)
W78-03448

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE: CHAPTER 5. BASIC PETROCHEMICALS INDUSTRY,
Radian Corp., Austin, TX.
For primary bibliographic entry see Field 5D.
W78-03457

ACCURATE CALCULATION OF TRANSPORT IN TWO DIMENSIONS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
F. M. Holly, Jr, and A. Preissmann.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY11, Proceedings Paper 13336, p 1259-1277, November 1977. 9 fig, 1 tab, 3 ref, 2 append.

Descriptors: *Path of pollutants, *Advection, *Diffusion, *Tidal waters, *Mass transfer, *Numerical analysis, Water pollution sources, Estuaries, Mathematics, Computers, Oceans, *Finite difference technique, Two-point higher order method, Error analysis.

Numerical calculations of pure advection based on interpolating polynomials evaluated using both the dependent variable and its derivatives were shown to be highly accurate. In one dimension, explicit methods of fourth or higher order are possible using information at only two computational points; a formal error analysis of the fourth-order method is corroborated through demonstrative calculations. Comparisons with other methods demonstrated that the two-point, fourth-order method is significantly more accurate than methods of fourth or higher order which use interpolations based on four or five computational points. Extension of the principle to advection-diffusion calculations in two dimensions demonstrated excellent accuracy. The two-point higher order principle was shown to have direct applicability to the calculations of two-dimensional advection and diffusion in tidal environments at a time scale of several tidal cycles. (Singh-ISWS)
W78-03463

DISPERSION OF A PASSIVE CONTAMINANT IN OSCILLATORY FLUID FLOWS,
Washington Univ., Seattle. Dept. of Oceanography.
L. H. Larsen.
Journal of Physical Oceanography, Vol. 7, No. 6, p 928-931, November 1977. 4 fig, 6 ref. NSF DES74-22711.

Descriptors: *Dispersion, *Estuaries, *Pollutants, *Model studies, Mathematical models, Flow, Tides, Tidal water, Salinity, Salts, Boundary layers, Shear, Velocity, Fluid mechanics, *Path of pollutants, Water pollution sources, Oscillatory flow.

In an effort to ascertain the relative importance of velocity shear and phase, dispersion in an osicillatory boundary layer was considered. Although salt is not strictly a passive contaminant, the model considered is relevant to the induced transport of salt in a tidal estuary. The results indicated a transport directed toward higher concentrations near a boundary whenever the velocity phase near that boundary leads the interior flow. (Sims-ISWS)
W78-03466

SEEPAGE FROM OXIDATION PONDS,
Tahal Water Planning for Israel Ltd., Tel Aviv. Dept. of Sewage Reclamation.
E. Idelovitch.
Progress in Water Technology, Vol. 9, No. 3, p 683-689, 1977. 3 fig, 3 tab, 6 ref.

Descriptors: *Seepage, *Oxidation lagoons, *Water loss, Seepage control, Clays, Soils, Hydrology, Foreign countries, Foreign research, Dunes, *Israel, Clay-lined bottoms.

Operation of the 120-ha Dan Region oxidation ponds in Israel during the period 1970-1974 showed that seepage from ponds constructed on sand dunes without any bottom lining declined by one order of magnitude within 3 to 4 years; average seepage rates diminished from several centimeters to a few millimeters per day and reached similar values to those of seepage from ponds constructed with clay-lined bottoms. This effect was believed to be due to the thin layer of sludge deposited on the bottom of the ponds. The sludge seals the interspaces between soil particles. Yearly water losses from the Dan Region oxidation ponds were estimated in 1975 at some 2.5 m or 3 million cu m. The yearly water losses correspond to an average seepage rate of 7 mm/day and represent about 15% of the present capacity of the ponds. (Lee-ISWS)
W78-03472

FIRST ANNUAL REPORT ENVIRONMENTAL PROTECTION AGENCY/CORPS OF ENGINEERS TECHNICAL COMMITTEE ON CRITERIA FOR DREDGED AND FILL MATERIAL,
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03481

NUMERICAL MODEL RESULTS OF DREDGED MATERIAL DISPOSAL AT TEN PROPOSED OCEAN DISPOSAL SITES IN THE HAWAIIAN ISLANDS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics Lab.
B. H. Johnson, and B. W. Holliday.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-A040 605, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper No. H-77-6, May 1977. 44 p, 4 fig, 2 tab, 5 ref, 2 append.

Descriptors: *Dredging, *Spoil banks, *Oceans, *Hawaii, *Pacific Ocean, *Model studies, Mathematical models, Dispersion, Sediments, Sediment transport, Currents(Water), Suspended solids, Sedimentology, Disposal areas, Dredged material disposal.

A numerical model has been developed by Tetra Tech, Incorporated. The model traces the movement of dredged material disposed in the aquatic environment and has been employed at 10 proposed ocean disposal sites in the Hawaiian Islands. The primary objecitve of the model applications was to provide a qualitative description of the behavior of the disposed material, with a corresponding estimate of how much of the material reached the bottom of each of the 1000-yd-radius disposal sites. In addition to model results, a brief description of the numerical model and the rationale for selection of the basic input data at the Pacific Ocean disposal sites were presented. Results from the study indicated that for the particular input data used, at most of the sites the majority of the material will leave the disposal site as suspended sediment rather than being deposited on the bottom. (Sims-ISWS)
W78-03483

EQUILIBRIUM OPERATION OF SUBSURFACE ABSORPTION SYSTEMS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W78-03507

FERRIC CHLORIDE TREATMENT REDUCES RIVER'S PHOSPHOROUS DISCHARGE,
Indiana Univ. at South Bend. Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W78-03508

WASTE WATER SURVEY OF A PARTIALLY SEWERED CITY,
T. A. Mahmood, S. A. Kanbar, and S. Ahmed.
Journal of the Institution of Engineers (India), Vol 57, Part EN 3, p 103-107, June, 1977. 4 fig, 4 tab, 10 ref.

Descriptors: *Outfall sewers, *Municipal wastes, *Water analysis, *Path of pollutants, *Industrial wastes, Flow characteristics, Hydrographs, Flow profiles, Waste water disposal.

A field study was conducted to examine quantitative and qualitative aspects of waste water in Mosul, Iraq, a city with an estimated population of 350,000. Much of the industrial and domestic waste water generated in the city is discharged to the Tigris River without treatment. During June, July, and August, 1972, bi-hourly flow measurements were taken at the city's 10 major outfalls.

Additional parameters measured during the survey included BOD and a deoxygenation constant. Minimum, maximum, and average flow rates were computed for each station. Individual hydrographs were calculated to illustrate daily variations in waste water flow. The hydrographs indicated that one peak in waste water flow occurred in areas that were predominantly residential, while multiple peaks occurred in areas which had mixed commercial and residential uses. The per capita waste water flow for Mosul averaged 280 liters/day. Waste water analyses were conducted with bi-hourly samples which were mixed to produce a flow-proportioned, 25-hr composite sample. Characteristics examined included total, suspended, and settleable solids; BOD; organic nitrogen; organic, ammonia, and nitrate nitrogen; chloride; pH; fat; alkalinity; total bacteria; and coliform bacteria. Analyses indicated that the waste water was primarily domestic in origin. (Schulz-FIRL)
W78-03559

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
R. W. Johnson, I. W. Duedall, R. M. Glasgow, J. R. Proni, and T. A. Nelsen.
Journal Water Pollution Control Federation, Vol. 49, No. 10, p 2063-2073, October, 1977. 11 fig, 1 tab, 13 ref.

Descriptors: *Sludge disposal, *Analytical techniques, *Mapping, *Suspended solids, *Monitoring, Atlantic Ocean, Waste water disposal, Environmental effects, Regression analysis, Chlorophyll, Remote sensing, Measurement, Path of pollutants, Waste water treatment.

Since large quantities of waste are dumped into the apex of the New York Bight and little is known about the dispersion of these wastes in coastal waters, studies were conducted to quantitatively map waste water sludge plumes on the basis of water quality properties and remotely sensed data. The testing program took place after a 2-day moratorium on sludge dumping in the Bight apex. Aircraft remove sensing and two surface vessels were used to map three waste water sludge plumes on September 22, 1975, with comparisons of suspended solids and chlorophyll-a concentrations obtained by the sea-truth and remote measurements. Spectral signatures were determined to allow specific identification of sludge plumes. Multiple regression techniques, including stepwise regression analysis, were used to reduce the remote sensing data. The statistical analyses indicated that calibrated regression equations were adequate for mapping the sludge plume by remote sensing with respect to suspended solids. For chlorophyll-a, however, interference with analyses and plume mapping was attributed to possible fluorescent characteristics of the waste water dump material. Comparison of data obtained for line and spot plumes revealed similar spectral characteristics. (Schulz-FIRL)
W78-03564

POLYCYCLIC AROMATIC HYDROCARBONS IN AGRICULTURAL SOIL (POLYZYKLISCHE, AROMATISCHE KOHLENWASSERSTOFFE IN LANDWIRTSCHAFTLICH GENUTZTEN BODEN),
Mainz Univ. (West Germany). Hygiene Inst.
H. Kunte.
Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, Abteilung 1: Originale, Reihe B, Vol 164, No 5-6, p 469-475, 1977. 2 fig, 3 tab, 19 ref.

Descriptors: *Fertilizers, *Organic compounds, *Soil amendments, *Soil analysis, *Sludge disposal, Environmental effects, Path of pollutants, Waste water disposal.

Since sewage sludge used to amend agricultural soils may contain considerable amounts of polycyclic aromatic hydrocarbons (PAH), studies were conducted to establish baseline concentrations of these substances in soils. Fifty soil samples were collected at various locations throughout West Germany and analyzed for six PAH forms, including fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, benzo(ghi)-perylene, and indeno (1.2.3-cd)pyrene. The average concentration of benzopyrene for 74% of the samples ranged from 2-50 ppm, while the total PAH concentration was 50-500 ppm. Higher values were attributed to extraneous sources of PAH. Previous studies on the cncentration of benzo(a) pyrene in soils are reviewed. (Schulz-FIRL)
W78-03566

DISSOLVED SOLIDS IN WASTEWATER,
Connecticut Univ., Stors.
H. E. Klei, D. W. Sundstorm, and A. J. Perna.
AIChE Symposium Series, Vol 73, No 166, p 380-383, 1977. 2 tab, 11 ref.

Descriptors: *Municipal wastes, *Dissolved solids, *Filtration, *Heavy metals, *Industrial wastes, Phosphorus compounds, Waste water treatment, Pollutant identification, Reverse osmosis, Ion exchange.

Characteristics of dissolved solids in municipal and industrial waste waters are reviewed. Total dissolved solids concentrations are normally measured by evaporation to dryness of the filtrate obtained after passing the sample water through a 0.2-0.45-micron membrane filter. Since most industries contribute heavily to the total dissolved solids cncentration of combined municipal and industrial waste, pretreatment of an industrial waste by ion exchange or reverse osmosis is suggested. Expected concentrations in municipal waste water of total, volatile, and fixed dissolved solids and of various contributing cations, anions, and organics are listed in tabular form. Components of industrial waste water are listed according to the particular type of industry. (Schulz-FIRL)
W78-03567

LEAK TESTING WITH DYED LIQUID TRACERS,
Shannon-Glow Inc., Los Angeles, CA.
J. R. Alburger.
Materials Evaluation, Vol. 35, No. 12, p 60-64, December, 1977. 6 ref.

Descriptors: *Analytical techniques, *Tracking techniques, *Fluorescent dye, *Tracers, Path of pollutants, Marking techniques, Dye concentrations, Fluorescence, Pollutant identification, Materials testing, Leakage, Sewers, Inflow, Waste water treatment.

Dyed liquid tracers have been used in a wide variety of applications, ranging from charting flow patterns in rivers to discerning leaks in pipelines. Fluorescent dyes have been used as an alternative to non-fluorescent visible color dyes which lose their tinctorial power rapidly by dilution. Fluorescent dyes, which can often be detected in extremely dilute solutions, generally fall into two categories: sensitizer dyes and color-former dyes. The sensitizer dyes exhibit strong fluorescence in thin films. The color-former dyes are normally used in conjunction with sensitizer dyes to shift the color response by cascading fluorescence. Bulk fluorescence is used in leak detection when the use of high tracer dye concentrations required for the thin-film mode is considered impractical. Dye tracers have been used to map water seepage in soil and to trace leaks in encapsulated electronic components and lead-through wires. Heating units and evaporative dyes have been used in conjuction with micro-leaks associated with surface porosity. The various dyed liquid leak tracer materials and processes are summarized. (Schulz-FIRL)
W78-03580

HEAVY METALS TRANSPORT MODEL IN A SLUDGE-TREATED SOIL,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. C. Sidle, L. T. Kardos, and M. T. van Genuchten.
Journal of Environmental Quality, Vol 6, No 4, p 438-443, October-December, 1977. 5 fig, 4 tab, 25 ref.

Descriptors: *Heavy metals, *Mathematical models, *Soil amendments, *Sludge disposal, *Path of pollutants, Soil chemical properties, Drainage effects, Soil investigations, Waste water disposal, Groundwater, Leachate, Percolation.

A one-dimensional solute transport model was developed to describe the movement of Cu, Zn, and Cd in sludge-amended soils. Freundlich adsorption isotherms were used to describe the adsorption of the cationic forms by the soil. The miscible displacement of chloride ions through undisturbed soil cores was used to determine the dispersion coefficient. A 17-month simulation period, with sludge inputs during the first 37 days and between the 168th and 196th days, was initiated to test the model's ability to predict the movement of Cu, Zn, and Cd in 15- and 120-cm soil percolates. Although the model predicted virtually no movement of the metals at either depth, field Cu, Zn, and Cd at 15 cm and 121, 305, and 800%, respectively, at the 120-cm depth. Accelerated movement of metals at times of high hydraulic loading through interconnecting soil channels was suggested as contributing to the large discrepancy between the predicted and observed values. Since the more highly soluble chelated forms of heavy metals may be transported to greater depths than their cationic counterparts, a partitioned model for metals transport was tested. The data generated indicated that mechanisms other than simple chelation are responsible for metals movement through soils. (Schulz-FIRL)
W78-03590

PYROLYSIS PROCESS FOR TREATING SEWAGE SLUDGE CONTAINING CHROMIUM,
NGK Insulators, Ltd., Nagoya (Japan). (Assignee).
For primary bibliographic entry see Field 5D.
W78-03594

PLANKTON INVESTIGATIONS IN ISHIKARI BAY, HOKKAIDO, ZOOPLANKTON BIOMASS DURING THE SUMMER AND AUTUMN OF 1975, (IN JAPANESE),
For primary bibliographic entry see Field 2L.
W78-03595

WASTEWATER TREATMENT THROUGH SOIL -- WITH SPECIAL REFERENCE TO SEPTIC TANK EFFLUENT TREATMENT,
ADI Ltd., Fredericton (New Brunswick).
For primary bibliographic entry see Field 5E.
W78-03620

SIMULATION OF QUALITY OF URBAN DRAINAGE EFFLUENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
J. Marsalek.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 564-579, 1976. 2 fig, 4 tab, 12 ref.

Descriptors: *Simulation analysis, *Water quality, *Urban drainage, *Urban runoff, *Storm water, *SWMM model, Effluents, Rainfall, Model studies, Equations, Pollutant loadings, Water quality data, Stepwise multiple linear regression, Storm sewers, Systems analysis.

The unsatisfactory performance of quality simulation models creates a need to re-examine basic assumptions and reformulate such conceptual models. Herein, some experience with the simulation of quality of urban runoff by means of the Storm Water Management Model (SWMM) of the U.S. EPA is summarized. An explanation for poor agreement between the simulated and observed runoff quality data is sought by a multivariate analysis of storm water data. For satisfactory modeling of runoff quality, the accuracy of modeling the total pollutant loadings is of primary importance, followed by the distribution of these loadings in time. Using the data of 19 storm water events for a test catchment, total pollutant loadings for four parameters are treated as multivariate data and their dependence on various factors is studied. From 83% to 92% of linear variation in the loadings is explained by linear variation in the antecedent dry period, the first parameter to enter a stepwise multiple regression analysis. The same parameter appears to be the most significant in the analysis of a random subset (10 events) of the data set discussed. No physically meaningful relationship is found between the total loadings and the total runoff volume, rainfall intensity, and antecedent storm rainfall. (Bell-Cornell)
W78-03641

TOTAL PHOSPHORUS MODEL FOR THE GREAT LAKES,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
S. C. Chapra.
Journal of the Environmental Engineering Division, Proceedings of the American Society of Civil Engineers, Vol. 103, No. EE2, p 147-161, April 1977. 5 fig, 3 tab, 39 ref.

Descriptors: *Water quality control, *Water management(Applied), *Great Lakes, *Forecasting, *Eutrophication, *Phosphorus, Lakes, Mathematical models, Equations, Simulation analysis, Oligotrophy, Effluents, Systems analysis, Path of pollutants.

A model based on conservation of mass is developed to simulate total phosphorus budgets for the Great Lakes. Phosphorus loadings are generated from variables indicative of human development, such as population and land use. The loadings are input to a budget model that can be solved for total phosphorus concentration as a function of time. A historical simulation is generated from census information for the period 1800 to 1970 and compares favorably with present measurements. The historical profiles indicate a dramatic increase in human impact on Lakes Erie, Ontario, and Michigan from 1950 to 1970 due to point sources. Projections indicate that, if point source effluents are reduced to 1 mg/l of total P by 1980, all the lakes will show some improvement in trophic condition. However, the analysis also indicates that control of diffus sources, particularly in Lake Erie, will be necessary of oligotrophy is the ultimate goal. (Bell-Cornell)
W78-03643

FAUNA AND DENSITIES OF MOLLUSCS IN SOME MOUNTAIN WATERS IN THE SURROUNDINGS OF DOMBAS (SOUTH NORWAY), (IN GERMAN),
Gesamthochschule Duisburg (West Germany).
W. Hinz.
Norw J Zool. 22(3), p 221-229, 1974.

Descriptors: *Mountain waters, Air pollution effects, Sulfuric rain, Sulfuric snow, Bivalves, *Dombas(Norway), Gastropod, Gyraulus-acronicus, Lakes, *Mollusks, Precipitation, Streams, Valvata-piscinalis, Water pollution.

In the south of Norway, 4 lakes and 3 streams situated at a height of 372-1227 m above sea-level were investigated malacologically and quantitatively with the Elkman-Birge grab, some other habitats were investigated qualitatively. Ten species of Sphaeriidae and 5 spp. of gastropods were found. The number of bivalves was between 0-10.4 animals/225 cm2. Exceptionally it was higher (up to 36.6 specimens/225 cm2) in flat marshy banks. Apart from Gyraulus acronicus in marshy shores of lakes (up to 3.5 animals/225 cm2) and an abundance of Valvata piscinalis, gastropods were not important with regard to the number of the individuals. The importance of the densities of molluscs for the critical examination of the pollution of waters by sulphuric rain and snow in southern Scandinavia is pointed out.--Copyright 1975, Biological Abstracts, Inc.
W78-03669

TRACKING POLLUTANTS FROM A DISTANCE,
Environmental Protection Agency, Las Vegas, NV. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W78-03670

THE FOUNDATIONS OF ORGANIC POLLUTANT ANALYSIS,
Municipal Environmental Research Lab., Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-03671

PROBLEM DEFINITION STUDIES ON POTENTIAL ENVIRONMENTAL POLLUTANTS II. PHYSICAL, CHEMICAL, TOXICOLOGICAL, AND BIOLOGICAL PROPERTIES OF 16 SUBSTANCES.
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5A.
W78-03672

A REVIEW OF TRACE ELEMENT STUDIES RELATED TO COAL COMBUSTION IN THE FOUR CORNERS AREA OF NEW MEXICO,
Los Alamos Scientific Lab., NM.
For primary bibliographic entry see Field 5A.
W78-03674

TRACE ELEMENTS IN THE TERRESTRIAL ENVIRONMENT OF A COAL-FIRED POWERHOUSE,
Du Pont de Nemours (E. I.) and Co., Aiken, SC. Savannah River Lab.
For primary bibliographic entry see Field 5A.
W78-03677

INFLUENCE OF THE SEDIMENT/WATER INTERFACE ON THE AQUATIC CHEMISTRY OF HEAVY METALS,
New England Aquarium, Boston, MA.
T. R. Gilbert, A. M. Clay, and D. A. Leighty.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-040 268, Price codes: A05 in paper copy, A01 in microfiche. Report No AFCEC-TR-76-22, June 1976. 81 p, 7 fig, 35 tab, 57 ref, append. 2103. F29601-75-C-0062.

Descriptors: *Trace elements, *Water analysis, *Water chemistry, *Sediment-water interfaces, *Chromium, *Cadmium, Groundwater, Mechanical properties, Adsorption, Phytoplankton, Water treatment, Pollutant identification, Path of pollutants, Sedimentation, *Heavy metals, Water pollution sources, *Silver, Mechanisms, Desorption.

The mechanisms controlling the transport of the three heavy metals cadmium, chromium, and silver in natural water systems were evaluated following a review of the scientific literature and laboratory studies of adsorption/desorption behavior and the interaction of these metals with phytoplankton. In fresh water, chromium as chromate is not appreciably taken up by model inorganic or organic particulates, but after reduction to Cr(III) it is rapidly and irreversibly taken up by clay particles, hydrous iron oxide, and phytoplankton. Cadmium and silver are more reversibly adsorbed by clay particles, are strongly adsorbed by hydrous manganese oxide, and are concentrated by phytoplankton. Once a part of reducing bottom sediments, the availability of all three metals to the aqueous phase is further reduced so that they are not released by short term resuspension. Results indicate that prolonged resuspension of anoxic sediments in an aerated water system can result in the reintroduction of cadmium to the water column, but chromium and silver, once a part of the sediment layer, are not likely to reenter the aqueous phase. The appendix presents the calculation method for concentration factors. (Wares-IPA)
W78-03678

ASBESTOS FIBERS IN DISCHARGES FROM SELECTED MINING AND MILLING ACTIVITIES. FINAL REPORT PART III,
McCrone (Walter C.) Associates, Inc., Chicago, IL.
For primary bibliographic entry see Field 5A.
W78-03687

A CRITICAL EVALUATION OF THE NON-RADIOLOGICAL ENVIRONMENTAL TECHNICAL SPECIFICATIONS - VOL. 2: SURRY POWER PLANT UNITS 1 AND 2,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5C.
W78-03697

BASELINE STUDY PROGRAM, NORTH PUGET SOUND BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL. II BIBLIOGRAPHY,
Beak Consultants Inc., Portland, OR.
J. W. Buell, and V. W. Kaczynski.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 292, Price codes: A20 in paper copy, A01 in microfiche. Report No. WA/DOE/BR-75/02, 200 p, 1975. 500 ref.

Descriptors: *Bibliographies, *Reviews, *Publications, *Baseline studies, Documentation, Data collections, Oil pollution, Water quality, Water quality standards, Environmental effects, Sounds, Oil, *Washington, Water pollution effects, *Puget Sound(Wash).

An annotated bibliography of current available literature on the ecology of the significant biological resources of Puget Sound and on the effects of oil spills and petrochemical products on those biota. It is intended for use in conjuncion with composite fact sheets and contains all consulted sources used in obtaining information for the fact sheets. Certain references of general interest on the subject of oil pollution and marine organisms are also included. (Klein).
W78-03698

5C. Effects Of Pollution

BACTERIAL CONTROL OF AQUATIC ALGAL POPULATIONS,
Medical Coll. of Ohio at Toledo.
For primary bibliographic entry see Field 5G.
W78-03201

'INNOVATIVE' ASSESSMENT TECHNOLOGY ALLOWS MORE ACCURATE PREDICTION.
Canadian Pulp and Paper Industry, Vol. 30, No. 16, p 14-16, November, 1977. 3 fig.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Evaluation, *Forecasting, *Environmental effects, Canada, Industrial wastes, Waste water treatment, Aquatic life, Salmon, Toxicity, Fish, Bioassay, Effluents.

The environmental impact assessment for the Donohue-St. Felicien kraft mill in northern Quebec, Canada, involved innovative assessment technology, including predictive research, extrapolation of existing literature, and subjective professional judgment. The critical environmental issues revolved around the land-locked Atlantic salmon population. Good spawning habitats were found upstream of the mill site. However, the stretch of the Ashuapmouchouan River at the mill site was a poor spawning area through which the salmon passed quickly during migration. All rainbow trout and varieties of Atlantic salmon tested survived in 80% concentrations of simulated treated effluent. Avoidance experiments using rainbow trout and land-locked salmon indicated no preference or avoidance at effluent concentrations of 5% or less. The river would average 0.5% effluent concentration and increase to 2% during the lowest flow in a 20-year period. It was concluded that the mill will not adversely affect the aquatic environment. (Snyder-FIRL)
W78-03209

ORGANIC BIODEGRADATION IN HYPERSALINE WASTEWATER,
E. M. Davis, J. K. Petros, and E. L. Powers.
Industrial Wastes, Vol 23, No 1, p 22-25, January/February, 1977. 4 fig, 4 tab, 4 ref.

Descriptors: *Biodegradation, *Saline water, *Salt tolerance, *Industrial wastes, *Activated sludge, Bacteria, Sewage bacteria, Biological treatment, Resistance, Waste water treatment.

Since various manufacturing processes generate hypersaline waste water, studies were conducted to examine the viability of activated sludge organisms in a hypersaline environment. Specific objectives included the isolation and/or identification of bacterial species capable of surviving in highly saline aqueous systems, the acclimation of salt tolerant bacteria to hypertonic waste streams, and the quantification of activated sludge processes for treatment of hypersaline industrial wastes. Laboratory experiments with synthetic wastes and ethylene glycol as a carbon nutrient source examined growth characteristics of four identified species of bacteria, six saltwater isolates, and two industrial unit operation seed cultures. Salt tolerance studies at concentrations ranging from 5% to 12% indicated that Bacterium T-52 and a bacterial isolate from Great Salt Lake were capable of growth at 12% salt concentrations. Benchscale studies were then conducted with continuous-feed activated sludge units. A reduction in the pH of the waste water from 10 to a level of 7-8 was required before any of the bacteria exhibited signs of functional metabolism. Reductions in TOC and BOD were measured at various nutrient levels and salinities. (Schulz-FIRL)
W78-03220

EVALUATION OF SAFETY FACTORS WITH RESPECT TO OCEAN DISPOSAL OF WASTE MATERIALS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
T. F. Zapatka, and R. W. Hann, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 400, Price codes: A06 in paper copy, A01 in microfiche. Sea Grant Program Report No. TAMU-SG-77-202, November 1976. 102 p, 8 fig, 11 tab, 77 ref. SG-04-6-158-44012.

Descriptors: *Toxicity, *Hazards, *Estuaries, *Waste disposal, *Water pollution effects, Ecosystems, Safety factor, Pollutants, Industrial wastes, Municipal wastes, Radioactive waste disposal, Solid wastes, *Ocean dumping, Marine environment, Environmental impact, Outer Continental Shelf, Military wastes.

Assessment of the risk and consequent environmental harm to the oceans is essential if ocean dumping is to be continued. The available literature, bioassay studies, and pertinent research concerning chronic effects and the risk they impose on the marine ecosystem were studied. The correlation between acute and chronic toxicities for known hazardous materials were investigated and defined. This relationship is vital for the determination of an appropriate safety factor to be used in evaluating allowable discharges or concentrations in the marine environment. The variables defined to be of most importance are: stage of development, concentration of toxicant, time of exposure, specific or non-specific reactions, lifetime of ratios for different conditions and situations or at least the ratios of acute to chronic toxicities for various classes of materials were determined. (Sinha-OEIS)
W78-03269

A PILOT STUDY ON THE DESIGN OF A PETROLEUM HYDROCARBON BASELINE INVESTIGATION FOR NORTHERN PUGET SOUND AND STRAIT OF JUAN DE FUCA,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W78-03271

SPORT FISHING IN WESTERN DELAWARE BAY: ASSESSMENT OF CRITICAL AREAS (RESEARCH ON THE EFFECTS OF CRUDE OIL TRANSFER AND UPSTREAM REFINERIES ON DELAWARE BAY),
Delaware Univ., Newark. Coll. of Marine Studies.
R. W. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 854, Price codes: A02 in paper copy, A01 in microfiche. Report to National Science Foundation, Research Applied to National Needs (RANN) No. CMS-RANN-2-75, 1975. 23 p, 4 fig, 7 tab, 4 ref. G141896.

Descriptors: *Estuaries, *Fisheries, *Delaware, *Sport fishing, Recreation, Economics, Water quality control, Baseline studies, Oil pollution, *Delaware Bay, Environmental assessment, Resources management.

Sport fishing in Delaware Bay is very important to the region's economy and recreation. Sport fishing pressure is greatest in the lower bay, espicially in areas associated with the channel running through the Ship Anchorage or lightering area. These five areas account for almost half of the total fishing pressure, with the Ship Anchorage by far the most important one. Trawl survey data also show this area had the highest total fish and weakfish densities of those areas sampled. The Ship Anchorage and associated areas should be protected to maintain their natural attributes, in spite of physical characteristics which might make them desirable for industrial development. A coastal ocean site which does not support a good sport fishery and is not within easy reach of small boats might be used for such projects as oil transfer and port development, if necessary. Even though the technical capability to build ports at ocean sites exists, productive estuaries can not be built. Though the cost of ocean port islands may be enormous, such approach is still more reasonable than permitting the deterioration of irreplaceable natural areas such as estuaries. (Sinha-OEIS)
W78-03277

IMPACTS OF OUTER CONTINENTAL SHELF ACTIVITIES: LAFOURCHE PARISH, LA,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
G. Happ, V. R. Bennett, W. H. Burke, III, W. H. Conner, and N. J. Craig.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 412, Price codes: A08 in paper copy, A01 in microfiche. Final Report to Louisiana State Planning Office, August 1976. 152 p, 17 fig, 17 tab, 96 ref, 3 append. LA- SPO-76-13.

Descriptors: *Resources development, *Baseline studies, *Environmental effects, *Oil spills, *Water pollution effects, Louisiana, Drainage patterns(Geologic), Eutrophication, Erosion, Ecosystems, Navigation, Transportation, Mineral industry, Land use, *Outer Continental Shelf, Environmental impact, Mineral extraction.

Three categories of activity studied in relation to Outer Continental Shelf (OCS) development are mineral extraction, navigation and transportation. Environmental impacts of OCS activities are described in terms of hydrocarbon discharge, altered drainage patterns, eutrophication, subsidence, erosion, direct land loss, changes in salinity and turbidity, and disruption of flora and fauna. The major environmental impacts of OCS activities are OCS employment-derived population increases, OCS use of pipeline ditches and navigational canals, and potential oil spills. OCS-use of oil and gas pipeline canals, and dredging of landfill, along with muck disposal, spoil banks are other sources of environmental impact upon Lafourche Parish. Direct land loss resulting in loss of primary production of marshes and swamps has a direct impact on the economy of the area. On the basis of preliminary data guidelines for OCS-related activities are suggested. (Sinha-OEIS)
W78-03288

BARATARIA BASIN: BIOLOGICAL CHARACTERIZATION,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
L. M. Bahr, and J. J. Hebrard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 807, Price codes: A08 in paper copy, A01 in microfiche. Sea Grant Publication No. LSU-T-76-005, May 1976. 155 p, 3 fig, 43 tab, 66 ref, append.

Descriptors: *Ecosystems, *Baseline studies, *Aquatic life, *Wetlands, *Water pollution sources, Ecology, Environmental effects, Estuaries, Marshes, Beaches, Physical processes, Chemical processes, Coastal marshes, Salt marshes, Bayous, Swampts, Aquatic habitats, *Nutrient transport, *Barataria Basin(LA), Coastal Zone Management, Outer Continental Shelf.

The biological characterization of the Barataria Basin includes a functional description of biological processes at both the ecosystem (basin) level and the habitat level, as well as summaries of research on distribution and abundance of animal groups. Water represents the prime integrating feature of the total ecosystem. The importance of rainfall, tidal flow, wind, temperature, storms, meandering of streams, and discharge from the Mississippi River is emphasized in relation to distributions of organisms and nutrients and also as a vehicle for pollutants. On the habitat level, swamp forests, fresh marshes, brackish marshes (including the intermediate marsh) saline marshes, beaches, and other elevated areas (i.e., chenieres, natural levees, and spoil banks) are discussed in terms of probable energy pathways by classification of organisms as producers, primary consumers (herbivores and detritivores), or secondary consumers (carnivores), with emphasis on water and its relationship to nutrient transport. (Sinha-OEIS)
W78-03289

TOXICITIES OF BLEACHING EFFLUENTS UNDER FINNISH CONDITIONS

(TOXICITETEN HOS BLEKERIAVLOPPSVATTEN I FINSKA FORHALLANDEN),
Finnish Pulp and Paper Research Inst., Helsinki.
O. Seppovaara.
Nordforsk Miljovardssekretariatet Publikation No. 2, p 113-125, 1976. 5 fig, 12 ref, 6 tab.

Descriptors: *Bleaching wastes, *Toxicity, Wastes, Industrial wastes, Water pollution sources, Foreign countries, Europe, Pine trees, Neutralization, Mixing, Humus, Fish, Water pollution effects, Pulp wastes, Pulp and paper industry, Waste dilution, Effluents, *Finland, Kraft mills, Birch trees(Betula).

After a general introduction to operating and effluent data for the 18 pulp mill bleach plants in Finland, known toxic substances present in bleaching effluents are reviewed along with the relatively low toxicity tolerances of Finnish receiving waters. Acute toxicity testing with bleaching effluents from a birch kraft pulp mill and a pine kraft pulp mill showed significant toxicity in the effluents from the chlorination and birch-kraft-mill hypochlorite stages, which could be reduced by neturalization or mixing with the rest of the mill effluent or by dilution with humus-containing water. Also considered are the effects of sublethal concentrations of toxic substances on fish. (Speckhard-IPC)
W78-03305

DIFFICULTY DECOMPOSED TOXIC SUBSTANCES FROM THE PULP AND PAPER INDUSTRY (SVARNEDBRYTBARA, TOXISKA AMNEN FRAN PAPPERS- OCH CELLULOSAINDUSTRIN),
Institutet for Vatten- och Luftvardsforskning, Stockholm (Sweden).
L. Landner.
Nordforsk Miljovardssekretariatet Publikation no. 2, p 127-150, 1976. 2 fig, 16 ref, 9 tab. In Swedish.

Descriptors: *Pulp wastes, *Toxicity, *Biodegradation, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Fish, Organic compounds, Pine trees, Bleaching wastes, Oxygen demand, Aerated lagoons, Condensates, Kraft mills, Slimicides.

This discussion on difficulty decomposed toxic substances in pulp and paper industry effluents covers substances stemming from the wood raw material, the determination of the degradability of different effluents and effluent components, the determination of the compounds in the effluents responsible for toxic effects, the determination of substance accumulatability in fish, and toxic substances stemming from chemical additives. Tables list the organic compounds in the evaporator condensate from a kraft pulp mill, the organic compounds in bleaching effluent from a pine kraft pulp mill effluents, low-molecular weight organic compounds in the inflow and outflow from a kraft-mill aeration pond, toxic components in the effluent from softwood kraft pulp mills, and toxicity to fish of slime-control agents. (Speckhard-IPC)
W78-03306

EFFECTS OF BLEACH PLANT EFFLUENTS FROM SULFATE PULP BLEACHING ON GROWTH AND PHOTOSYNTHESIS OF PLANKTONIC ALGAE (EFFEKTER AV BLEKERIAVLUTAR FRAN SULFATMASSABLEKNING PA TILLVAXT OCH FOTOSYNTES AV PLANKTISKA ALGER),
Institutet for Vatten- och Luftvardsforskning, Stockholm (Sweden).
L. Landner, and T. Larsson.
Svensk Papperstidning, Vol. 80, No. 12, p 371-378, 380, September 10, 1977. 6 fig, 17 ref, 11 tab. English summary.

Descriptors: *Bleaching wastes, *Algae, *Water pollution effects, *Photosynthesis, Pulp wastes, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Microorganisms, Aquatic life, Phytoplankton, Marine algae, Fish food organisms, Water pollution.

Bleach plant effluents are an important source of persistent colored organic water pollutants. The effects of these compounds on primary phytoplankta (which are the basis of fish production in the sea) were investigated in laboratory studies, using stabilized (long-term aerated) chlorination and alkaline extraction effluents from softwood kraft pulp (free from easily degradable substances), plus an ion-exchanged alkaline extraction effluent. Results indicated that a natural algal population (such as that occurring normally in the Baltic Sea) responds to such exposures by reduced photosynthesis and primary production. A significant drop in primary production was recorded in the presence of extraction-stage effluent diluted 1000-fold, and of chlorination-stage or treated extraction-stage effluents diluted 100-fold. This detrimental effect of bleaching effluents was only partly connectable with their light-absorbing capacity, and involved a direct inhibition of algal cells. (Brown-IPC)
W78-03316

STUDIES ON THE MUTAGENIC PROPERTIES OF BLEACHING EFFLUENTS,
Swedish Forest Products Research Lab., Stockholm.
P. Ander, K.-E. Eriksson, M.-C. Kolar, K. Kringstad, and U. Rannug.
Svensk Papperstidning, Vol. 80, No. 14, p 454-459, October 10, 1977. 3 fig, 15 ref.

Descriptors: *Bleaching wastes, *E. coli, *Salmonella, *Water pollution effects, Wastes, Industrial wastes, Water pollution source, Effluents, Pulp and paper industry, Pulp wastes, Aquatic microorganisms, Pathogenic bacteria, Microorganisms, Biodegradation, Genetics, *Mutagenicity.

Commercial and laboratory-prepared effluents from the bleaching of softwood kraft pulps were tested for mutagenicity towards a streptomycin-dependent strain of Escherichia coli and different histidine-requiring mutant strains of Salmonella typhimurium. None of the tested effluents caused mutations in E. coli, but chlorination-stage effluents caused mutations in 2 Salmonella strains (TA 1535 and 1537). A weak mutagenic activity was also shown by concentrated hypochlorite-stage effluent. These results clearly show that chlorination-stage effluents from kraft pulp bleach plants contain mutagenic compounds and indicate that both alkylating and intercalating mutagenic substances are present. The addition of liver microsomes decreased the mutagenic activity indicating that the mutagenic compounds are partly degradable in the liver. (Brown-IPC)
W78-03317

SEWAGE FUNGUS GROWTH IN RIVERS RECEIVING PAPER MILL EFFLUENT,
Research Association for the Paper and Board, Printing and Packaging Industries, Surrey (England).
J. C. Roberts.
Water Research, Vol. 11, No. 8, p 603-610, 1977. 6 fig, 15 ref, 7 tab.

Descriptors: *Pulp wastes, *Aquatic fungi, *Water pollution effects, Wastes, Industrial wastes, Water pollution sources, Carbohydrates, Effluents, Pulp and paper industry, Foreign countries, Organic compounds, Flocculation, Chemicl precipitation, Sewage treatment, Waste water treatment, Sphaerotilus, Aquatic microorganisms, Aquatic bacteria, United Kingdom, Monosaccharides, Glucose, Starch.

The results of this investigation show that starch and its degradation products are likely to be the major cause of sewage fungus growths in the river below a paper mill in the United Kingdom. The mill produces paper for printing and wrapping and uses no chemical wood pulping process. Imported wood pulp and recycled paper are the only sources of cellulose fiber. Analysis of effluent composition showed an average value of 67% carbohydrate in the dissolved organic material. Effluent which had undergone primary treatment (chemical flocculation and settlement) was used to determine that a high percentage of the carbohydrates, in the form of polysaccharides, had molecular weights from about 2,000 to over 10,000. Surprisingly the predominant monosaccharide obtained by hydrolysis was glucose. This suggests that most of the polysaccharides do not originate from the disintegration and beating of chemically produced wood pulps (which yield mostly xylans), but from starch used for surface sizing of waste paper. Soluble oxidized starch and high-molecular weight polysaccharides (molecular weight over 10,000) are shown to be readily utilized by Sphaerotilus, the dominant bacterium found in the sewage fungus community. (Du Vall-IPC)
W78-03323

PROCEEDINGS, RESEARCH PLANNING CONFERENCE ON THE AQUATIC PLANT CONTROL PROGRAM, 22-24 OCTOBER 1975, CHARLESTON, S.C.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5G.
W78-03429

POSSIBLE EFFECTS OF THE INTRODUCTION OF THE WHITE AMUR INTO LAKE CONWAY, FLORIDA,
Florida Univ., Gainesville. School of Forest Resources and Conservation; and Florida Univ., Gainesville. Center for Wetlands.
K. C. Ewel, and T. D. Fontaine, III.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24, October 1975, Charleston, S.C., p 64-84, December 1976. 11 fig, 3 tab, 8 ref.

Descriptors: *Biocontrol, *Aquatic weed control, *White amur, *Lake Conway(FL), *Hydrilla verticillata, Florida, Lakes, Ecosystems, Model studies, Nutrients, Phosphorus, Phytoplankton, Eutrophication, Ctenopharyngodon idella, Monosex fish.

A preliminary model was developed to predict ecological effects of introducing monosex white amur fish (Ctenopharyngodon idella) into Lake Conway, Florida in the winter of 1977 to control the submersed macrophyte Hydrilla verticillata. Four simulations were run: (1) hydrilla allowed to grow unrestrained; (2) herbicide added; (3) white amur introduced; and (4) use of both herbicide and white amur. The lowest standing stock of hydrilla occurs with (4), and the highest with (1); standstock is seven times less using herbicide and amur than under no management. None of the programs completely eliminate hydrilla, as tubers and turions continue to be produced. A phytoplankton bloom occurs with (4) due to increased availability of phosphorus, resulting from diminished uptake with the decline in standing stocks of vegetation. Reduction in hydrilla-caused shading by the use of herbicide results in the best growth of native submersed plants. All management efforts decrease algal periphyton due to reduction of their main substrate, the hydrilla. Native fish show best growth under no management; periphyton supply seems to control fish population. Shallow-level detritus accumulation is least with (3) and (4), and greatest with (1). Amur actually assimilate less than 0.2% of the hydrilla, however, with the rest going to the detritus. (See also W78-03429) (Lynch-Wisconsin)
W78-03440

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II - FINAL REPORT (APPENDIX, LISTING OF REFERENCES),
Stanford Research Inst. Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-03456

ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE. VOL II - ROCKY MOUNTAIN REGION CASE STUDIES,
Enviro Control, Inc., Rockville, MD.
W. Nelson, G. Horak, A. Hale, Z. Parkhurst, and M. Lewis.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 471, Price codes: A16 in paper copy, A01 in microfiche. Report No. FWS/OBS - 76/30, August 1976. 373 p, 58 fig, 3 tab, 144 ref. 049-75, 14-16-0008-956 FWS.

Descriptors: *Dams, *Reservoir releases, *Flow control, *Habitats, *Water management(Applied), Hydrology, Fish, Wildlife, Diversion, Relative rights, Riparian rights, Arizona, Colorado, Montana, New Mexico, Utah, Wyoming, *Fish and Wildlife Service, Instream flow, Minimum flow.

Individual analyses of changed flow regimes below dams, impact statements on fisheries, and methodologies used to assess flow requirements for 49 dams and diversions in the Rocky Mountain region in Arizona, Colordao, Montana, New Mexico, Utah, and Wyoming are presented. Analysis of each project is based on a description of the project in terms of location, geographic relationships, terrain, native wildlife and biology, structures, hydrology, proposed or recommended flow regimes, and estimates of effect or results of changed flow regimes on fisheries and biology. Constraints on recommendations, i.e., the lack of hydrologic data or recognition of demand for diversionary use of water, are recognized where applicable. Based upon analytical results, recommendations are made for altering flow regimes to reduce sedimentation, support habitat, and assist irrigation projects. In most cases, if was concluded that a suitable aquatic habitat could be maintained by adjusting flow regimes to meet seasonal or specified demands, e.g., fishery development. The effect of downstream water rights on changes in flow regimes was also considered where appropriate. (Wares-IPA)
W78-03459

LAKE CONSTANCE: ENDANGERMENT AND POSSIBILITIES FOR REHABILITATION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
H. -J. Elster.
Naturwissenschaften 64(4), p 207-215, 1977.

Descriptors: Lakes, *Eutrophication, *Primary productivity, *Phosphates, Oxygen content, Hypolimnion, Water pollution control, Pollution abatement, Sewage, *West Germany(Lake Constance).

Lake Constance (West Germany) has become eutrophic due to increased sewage and, particularly, phosphate input. Primary production has increased, the O2 content of the hypolimnion decreased. The consequences for the whole ecosystem are discussed. Implementation of both technical (sewage- treatment plants with phosphate precipitation) and political (local planning for the whole drainage area of the lake) measures is necessary to insure recovery of the lake; these were initiated some years ago.--Copyright 1978, Biological Abstracts, Inc.
W78-03464

THE EFFECT OF SLUDGE DIGESTION ON VIRUS INFECTIVITY,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Dept. of Virology and Immunology.
A. Eisenhardt, E. Lund, and B. Nissen.
Water Research, Vol 11, No 7, p 579-581, 1977. 3 fig, 12 ref.

Descriptors: *Viruses, *Bioassay, *Anaerobic digestion, *Viricides, *Disinfection, Sludge digestion, Microorganisms, Sewage treatment, Analytical techniques, Pilot plants, Sludge treatment, Waste water treatment.

Virus inactivation during anaerobic sludge digestion was investigated in laboratory experiments with cocksievirus B3. A virus suspension was added to an experimental digester which was operated to simulate the operation of a full-scale digester. Three control series including pasteurized sludge, Hank's solution at 32C, and calf serum at 32C, were set up at the same virus concentration and pH (7.0). Inactivation rates determined for the four systems over a two-week period indicated that inactivation was fastest in pasteurized sludge. The inactivation rate for Hank's solution was lower than for pasteurized sludge and higher than for calf serum. An increase in temperature from 32C to 35C increased the inactivation rate for all four systems. Virus determinations for supernatants of centrifuged sludges indicated that some virus was bound to the sludge, since solids' virus determinations were 1.0 log units higher than supernatants'. Additional studies indicated that inactivation rates were not influenced by the initial virus concentration over a range of 4 log units. It was suggested that virus inactivation was partially controlled by biochemical factors instead of purely biological phenomena. (Schulz-FIRL)
W78-03517

OBSERVATIONS ON THE OVERWINTERING GAMBUSIA AFFINIS (THE MOSQUITO FISH) IN TOKUSHIMA CITY, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
Y. Hirose.
Jpn J Sanit Zool 27(3), p 311-312, 1976.

Descriptors: *Mosquito fish, *Japan(Tokushima City), Sewers, Municipal wastes, Water quality, Hydrogen ion concentration, Biochemical oxygen demand, Dissolved oxygen, Minerals, Sex, Temperature, Water pollution.

G. affinis wintering in the sewer system in Showacho, Tokushima-shi, Japan were studied. The average body length of 34 male fish was 21.5 plus or minus 1.9 mm, that of 73 female fish 22.5 plus or minus 3.3 mm, and that of 28 young fish 15.5 plus or minus 0.8 mm. The average body weight of male fish was 157.5 plus or minus 41.6 mg, that of female fish 197.9 plus or minus 91.1 mg, and that of young fish 65.9 plus or minus 0.8 mg. Seventy-one female fish of the total 73 had immature eggs. The water temperature of the sewer system where the fish were found was above 9 degrees C. The water quality was studied in terms of pH, dissolved Oz, transparency, NOz- ammonium N, Pi, biochemical Oz demand, alkylbenzene sulfate, hardness and Cl-. The fish were observed to winter in the mud in the bottom of the shallow water as sewer water.--Copyright 1978, Biological Abstracts, Inc.
W78-03583

PHYTOPLANKTON OF THE BRITAJIAN RESERVOIR (THE NORTHERN DONETS RIVER), (IN RUSSIAN),
Kharkov State Univ. (USSR).
R. P. Zhupanenko.
Gidrobiol Zh 12(6), p 24-29, 1976.

Descriptors: *Phytoplankton, Reservoir, Algae, *USSR(Britajian Reservoir), Biomass, *Cyanophyta, *Diatoms, Protococcaceae, Seasonal.

The phytoplankton of the Britajian reservoir (USSR) includes 274 spp. and intraspecific taxa of algae among which Diatomeae and Protococcaceae are the most numerous. Clearly pronounced seasonal changes in the phytoplankton are detected; changes in species composition were 148 ssp. in spring, 236 in summer, 227 in autumn, and 57 in winter. As to the number and biomass, Cyanophyceae were predominant in summer, and Diatomeae in spring and autumn. Annual changes in the phytoplankton are observed. Dominant species which are indicative of a sanitary-biological state (water for drinking, etc.) are of primary importance.--Copyright 1978, Biological Abstracts, Inc.
W78-03603

THE INFLUENCE OF WARM WATERS OF THE KONAKOVO HYDROELECTRIC POWER STATION ON THE INFECTION LEVEL OF YOUNG ROACH WITH MYXOSPORIDIANS, (IN RUSSIAN),
Leningrad State Research Inst. Lake River Fish Industry (USSR).
V. P. Solomatova, A. V. Luzin, and A. A. Yarmolinskii.
Parazitologiya (Leningr) 10(6), p 514-518, 1976.

Descriptors: *Thermal pollution, Seasonal, Water pollution effects, *Roach, Heated water, Hydroelectric powerplants, USSR, Chloromyxum-legeri, *Myxidium-rhodei, Myxobolus-spp, Sphaerospora-poljanskii, Zschokkella-costata.

Data are given on the effect of warm waters of the Kanokovskaya hydro-electric power station (USSR) on the infection level of the roach young with myxo-sporidians. One year old specimens (1641) of roach were examined. Myxobolus dispar, M. Muelleri, M. emmachili, M. obesus, M. pseudodispar, Myxobolus sp. I, Myxobolus sp. II, Myxidium rhodei, Chloro-myxum legeri, Zschokkella costa ta and Sphaerospora poljanskii are reported from the warm water zone while in the gulf beyond the warm zone M. muelleri, M. nemachili, M. pseudodispar, Myxobolus sp. I, M. rhodei, C. legeri and Z. costata were recorded. Only C. legeri and Z. costata larvae were recorded. Their development was studied. In warm water the developmental period from plasmodium to spore in C. legderi was accelerated from 20 days to 15 days. In winter in the warm water zone sporeformation of many species of myxosporidians takes place. Infection with plasmodial stages remains high and indicates continuous active feeding of the young even in winter.--Copyright 1978, Biological Abstracts, Inc.
W78-03612

ZOOPLANKTON OF THE LOWER VOLGA, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Inst. Rybnogo Khozyaistva, Astrakhan (USSR).
S. N. Kushnikova.
Gidrobiol Zh. 10(6), p 70-74, 1974.

Descriptors: Copepods, Dams, *Lower Volga(USSR), Plankton, Rotifers, *Zooplankton, *Crustaceans, Hydroelectric power plants, *Post-impoundment, Reservoirs.

Data are presented on the qualitative composition of zooplankton of the Lower Volga (USSR) in 1968-1970. There were 6, 8 and 7 spp. of copepods in 1968, 1969 and 1970, respectively; cladocerans 10, 13 and 8; and rotifers 20, 15 and 17. The qualitative composition of zooplankton of the Lower Volga in 1968-1970 did not differ substantially from that during the 1st years after streamflow control by a dam. After construction of the Vologograd hydroelectric station the role of crustaceans in the plankton increased considerably. Crustaceans were carried away from the

reservoir, and the current velocity and suspended matter of the river decreased. There is 1 population peak at the recession of the flood, due to the development of Cladocera. The content of zooplankton decreases downstream from the dam and crustaceans are replaced by rotifers.--Copyright 1975, Biological Abstracts, Inc.
W78-03618

FEEDING OF THE PERCH AND RUFF IN THE DISCHARGE ZONE OF THE KURAKHOVO STATE REGIONAL ELECTRIC POWER STATION, (IN RUSSIAN),
Kiev State Univ. (USSR).
M. F. Polivannaya.
Gidrobiol Zh. 10(6), p 84-86, 1974.

Descriptors: *Cooling ponds, Electric powerplants, Thermal pollution, Heated discharge, *Heated water, Fish diets, *Perch, Plankton, *Fish reproduction, *Ruff, Ukrainian-SSR, USSR, Zooplankton.

Investigations of the feeding of the perch and ruff in the cooling pond of the Kurakhovo state region electric power station on the Volchya River in the Ukrainian SSR (USSR) established the following facts. Fattening occurs year-round, including the reproduction period. A large part of the diet of the fishes is composed to zooplankton, different species of which predominate in the heated and unheated parts of the cooling pond. As a rule the ponderal index of the fishes is greater in the heated part.--Copyright 1975, Biological Abstracts, Inc.
W78-03622

INTERNATIONAL COOPERATION IN STUDYING THE HEALTH ASPECTS OF ORGANIC CONTAMINANTS IN INDIRECTLY REUSED WASTE WATER,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
B. C. Zoeteman.
Annals of the New York Academy of Sciences, Vol 298, p 561-573, 1977. 2 fig, 6 tab, 24 ref.

Descriptors: *Water reuse, *Public health, *Organic compounds, *Waste water disposal, *Potable water, Path of pollutants, Chemical wastes, Environmental effects.

Since much of the world's water supplies contains some proportion of sewage effluent which enters drinking water through indirect reuse, more extensive investigations into the health effects relating to direct and indirect reuse of waste water for human consumption have been recommended. Health risks associated with organic contaminants in tap water may be assessed by identification of the individual chemicals and by examination of the toxicologic properties of individual and combined chemicals, or by evaluating the characteristics and effects of the water as a whole. The principal organic contaminants found in drinking water in the United States are described. European studies on health aspects of organic contaminants in drinking water have included a survey of organic contaminants in tap water of 20 major cities in the Netherlands; preparation and toxicologic screening of concentrates of organics in drinking water; and epidemiologic studies. Studies concerned with source identification of drinking water contamination and with regulatory programs on environmental chemicals in Europe are described. (Schulz-FIRL)
W78-03627

ASSESSMENT OF ENVIRONMENTAL IMPACT ON THE AQUATIC ENVIRONMENT WITH LIMITED DATA,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
P. E. Flatt, and C. D. D. Howard.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 435-444, 1976. 1 fig, 4 ref.

Descriptors: *Assessment, *Aquatic environment, *Pipelines, Effects, Simulation analysis, Rainfall-runoff relationships, Construction, Frequency analysis, Data collections, Streams, Hydrologic aspects, Equations, Watersheds(Basins), Mathematical models, Systems analysis, *Environmental impact, *Limited data, Hydrologic behavior, Kinematic wave method.

The aquatic physical setting and the potential impact of construction of a northern pipeline on the aquatic environment were investigated using limited field data and office calculations. Hydrological behavior of all streams crossed by the pipeline was assessed using a kinematic wave method of analysis applied to a conceptual watershed model. Topographic data and an analysis of precipitation and snowmelt were the only inputs to this model. The Universal Soil Loss equation was applied with parameters estimated from the hydrological analysis, surficial geological maps and areal photographic interpretation. For each catchment, the area of disturbance, estimated from proposed construction plans, was used to calculate potential erosion rates and suspended sediment concentration increases. Data were used only to verify the analysis. A watershed classification system reflected the flood potential of each stream in terms of climatological and topographical parameters. Results indicated that watersheds having a large fraction of their drainage area disturbed by the project will require special attention if adequate environmental protection is to be achieved. (Bell-Cornell)
W78-03639

TOTAL PHOSPHORUS MODEL FOR THE GREAT LAKES,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W78-03643

WATER BIRDS AND THEIR WETLAND RESOURCES IN RELATION TO OIL DEVELOPMENT AT STORKERSEN POINT, ALASKA,
Iowa State Univ., Ames. Dept. of Animal Ecology.
R. D. Bergman, R. L. Howard, K. F. Abraham, and M. W. Weller.
Department of the Interior, Fish and Wildlife Service, Resource Publication No 129, 1977. 38 p, 10 fig, 14 tab, 58 ref.

Descriptors: *Wetlands, *Oil fields, *Alaska, *Classification, *Environmental effects, *Brood stock, *Water pollution effects, Oil, *Water birds, Wildlife, Shorebirds, Wading birds, Tundra, Conservation, Invertebrates, Waterfowl, Hatching, Aquatic plants, Wildlife habitats, Nesting cover, Food habits, Oil pollution, Breeding populations, Tundra birds, Storkersen Point(Alas).

During a 5-year study of the bird populations on the Alaskan Coastal Plain, 25 of the 72 species recorded were breeding. To provide insight into habitat use and to devise systems for protecting key habitats, wetlands were classified on the basis of size, depth, vegetation, and water chemistry into eight classes related to bird use. To determine factors influencing class use and to understand the food relationships and problems of pollution of wetlands, invertebrate populations were examined in major freshwater wetlands. There is a strong relationship between the presence of emergent Arctophila and Carex and high invertebrate populations. Peak populations coincide with peak hatching of shorebirds and ducks. It is concluded from limited sampling of bird food habits that invertebrates constitute the major food source for many bird species. Retention of large breeding populations of tundra birds is uncertain with the disturbance and change that comes from oil development. Preservation should include: large tracts where no oil development occurs, small and well-distributed units of about 42 sq km which should be left undisturbed but which should not prevent oil removal, and protection of key production units from pollutants even in areas of intense development for oil. (Steiner-Mass)
W78-03657

IDENTIFICATION OF SELECTED FEDERAL ACTIVITIES DIRECTED TO CHEMICALS OF NEAR-TERM CONCERN (BENZENE, BIS(CHLOROMETHYL) ETHER, CADMIUM, HYDROGEN SULFIDE, MERCURY, PLATINUM, POLYNUCLEAR AROMATIC HYDROCARBONS, TRICHLOROETHYLENE, TRIS (2,3-DIBROMOPROPYL), PHOSPHATE).
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
For primary bibliographic entry see Field 5A.
W78-03666

PROBLEM DEFINITION STUDIES ON POTENTIAL ENVIRONMENTAL POLLUTANTS II. PHYSICAL, CHEMICAL, TOXICOLOGICAL, AND BIOLOGICAL PROPERTIES OF 16 SUBSTANCES.
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5A.
W78-03672

REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES, 1976 EDITION.
National Inst. for Ocupational Safety and Health, Rockville, MD.
For primary bibliographic entry see Field 5A.
W78-03679

OXYGEN CONSUMPTION IN THE PROSOBRANCH SNAIL VIVIPARUS CONTECTOIDES (MOLLUSCA: GASTROPODA) - II. EFFECTS OF TEMPERATURE AND PH,
Michigan Univ.-Flint. Dept. of Biology.
M. J. Buchingham, and D. E. Freed.
Comparative Biochemistry and Physiology, Vol. 53A, 1976, p 249-252, 2 fig, 2 tab, 26 ref.

Descriptors: *Environmental effects, *Thermal pollution, *Water pollution, Temperature, :Metabolism, Hydrogen ion concentrations, *Snails, Energy budget, *Oxygen consumption(Mollusks).

This paper continues a group of articles on the relationships of environmental parameters to the energy budgets or metabolism in Viviparus contectoides and reports specifically on the effects of acute changes in water temperature and pH on oxygen consumption in the species. Data showed that metabolic rate is directly dependent on temperature with males having a rectilinear relationship between weight-adjusted oxygen consumption and females having a curviliner relationship. The mean values in this relationship were higher for males than for females. With increasing temperature, Q10 values decreased for males and increased for females. The rate of oxygen consumption was related to pH due to increasing and decreasing levels of metabolic activity at different pH values. This population lives at the trough pH (8.1) which is energetically more favourable. The species is capable of existing at the two peak values (7.1 and 8.9) but it is energetically stressful for them to do so. (Chilton-ORNL)
W78-03696

A CRITICAL EVALUATION OF THE NON-RADIOLOGICAL ENVIRONMENTAL TECHNI-

CAL SPECIFICATIONS - VOL. 2: SURRY POWER PLANT UNITS 1 AND 2,
Oak Ridge National Lab., TN.
S. M. Adams, P. A. Cunningham, D. D. Gray, and K. D. Kumar.
Available from the National Technical Information Service, Springfield, VA 22161 as ORNL/NUREG/TM-70, Price codes: A10 in paper copy, A01 in microfiche. Report No. ORNL/NUREG/TM-70 (Vol. 2 of ORNL/NUREG/TM-69), February 1977. 265 p, 90 fig, 26 tab, 50 ref, 1 append. W-7405-eng-26.

Descriptors: *Environmental effects, *Monitoring, Powerplants, *Nuclear powerplants, Hydrothermal studies, Ecology, Regulation, Virginia, James River basin(Va), Surry Power Plant(Va), Nuclear Regulatory Commission.

Analysis of hydrothermal and ecological monitoring data collected from 1973 through 1975 as part of a program for the Office of Regulatory Research of the U.S. Nuclear Regulatory Commission is presented. Hydrothermal analysis includes a discussion of models used in plume predictions prior to plant operation and an evaluation of the present hydrothermal monitoring program. Ecological analysis includes validation of impacts predicted in the Final Environmental Statement using the operational monitoring data. Specific recommendations are made for improvement of both monitoring programs. (Chilton-ORNL)
W78-03697

BASELINE STUDY PROGRAM, NORTH PUGET SOUND BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL. II BIBLIOGRAPHY,
Beak Consultants Inc., Portland, OR.
For primary bibliographic entry see Field 5B.
W78-03698

THE SILVER FLOWE. II FEATURES OF THE VEGETATION AND STRATIGRAPHY OF BRISHIE BOG, AND THEIR BEARING ON POOL FORMATION,
Hull Univ. (England). Dept. of Plant Pathology.
D. J. Boatman, and R. W. Tomlinson.
The Journal of Ecology, Vol. 65, No. 2, p 531-546, July, 1977. 5 fig, 3 tab, 17 ref.

Descriptors: *Ponds, *Bogs, *Peat, Stratigraphy, Vegetation, Plant growth, Growth rates, *Bogs, *Brishie Bog(Scotland), *Silver Flowe(Scotland), Sphagnum papillosum, Sphagnum cuspidatum, Calluna vulgaris, Bryophytes.

A study of the vegetation and stratigraphy of Brishie Bog in the Silver Flowe National Nature Reserve in southwestern Scotland indicates that growth characteristics of Sphagnum papilosum and S. cuspidatum are responsible for permanent pool formation. Areas of high percentage cover of S. papillosum, the most common species in the bog's eastern lobe. Stratigraphical evidence from core samples shows that at low-lying sites S. papillosum and S. cuspidatum alternately constitute important components of the vegetation. The weak-stemmed S. cuspidatum can often be seen lying horizontally across part of an S. Papillosum carpet, and where sufficiently dense can smother and kill S. papillosum locally. Hollows and pools seem to be suboptimal for S. cuspidatum growth, and peat formation will be low; unless the area is reinvaded by S. papillosum, the surface will become progressively lower and eventually form a permanent pool. Subsequent flooding of low-lying sites between neighboring pools may lead to the formation of long narrow pools parallel to the contours. It appears that where hummocks occur, the conditions have fluctuated between those of hummocks and S. papillosum carpets, and where hollows or pools occur they have fluctuated between conditions of hollows and carpets. A method was developed for determining the rate at which sphagnum surfaces rise by comparing the age of adventitious Calluna vulgaris roots and the depth at which they occur in the sphagnum carpet. (See also W75-02511)
W78-03699

LIMITATIONS OF MACROPHYTES IN A EUTROPHIC LAKE, LOCH LEVEN. II. WAVE ACTION, SEDIMENTS, AND WATERFOWL GRAZING,
Saint Andrews Univ. (Scotland). Dept. of Botany.
B. P. Jupp, and D. H. N. Spence.
Journal of Ecology, Vol. 65, No. 2, p. 431-446, July 1977. 3 fig, 5 tab, 31 ref.

Descriptors: *Waves, *Waterfowl, *Biomass, *Phosphorus, *Eutrophication, Phytoplankton, Lakes, Nutrients, Grazing, Sediments, Light penetration, *Macrophytes, *Loch Leven(Scotland), Potamogenton filiformis, Potamogenton pectinatus.

Limitations on the growth of the two most important submerged macrophytes in Loch Leven, Scotland, were shown to adversely affect the ecological diversity of this internationally important site for waterfowl and renowned brown trout fishery. The paper reports that protection from wave action and from waterfowl grazing by Perspex tubes and wire enclosures led to increased biomass levels, with findings corrobaroated by transplant experiments between a sheltered and exposed site. Up to 80 percent of the end of season biomass differences could be attributed to the effects of wave action and the remainder to waterfowl grazing. Consistent reduced light attentuation and the consequent availability to attached macrophytes of a deeper water column. It is recommended, therefore, that input of available phosphorus be reduced in order to control the phytoplankton blooms, upon which light attentuation ultimately depends. In addition creation of shallow lagoons and breakwaters in certain locations would decrease exposure of macrophytes to wave action. (Coyle-Wisconsin)
W78-03700

5D. Waste Treatment Processes

STARCH RECOVERY EXCEEDS 90% WITH LIQUID CYCLONE SYSTEM.
Chemical Processing, Vol. 40, No. 13, p 104, November, 1977. 1 fig.

Descriptors: *Pulp and paper industry, *Adhesives, *Biochemical oxygen demand, *Treatment facilities, Centrifugation, Reclamation, Binders, Industrial wastes, Waste water treatment, Waste water disposal.

Starch-based adhesives are frequently used to bond various layers of paperboard in corrugated boxes. When starch applicators are washed, a large amount of starch enters the wash water. The large biochemical oxygen demand (BOD) load on disposal systems may overload in-plant systems and result in stiff penalties if waste waters are discharged into municipal sewage systems. A system manufactured by Dorr-Oliver Inc. of Stanford, Connecticut, uses hydrocyclones to remove the starch and recover the waste water for reuse. After the slurry is strained, a two-stage hydrocyclone is used for clarification. Several 10-mm cyclones are arranged in parallel and enclosed in a single, pressurized stainless steel housing. Typical maximum feed rates are around 30 gpm. This system permits reuse of large quantities of process water, reduces the cost of treatment, and reduces the BOD surcharge. Maintenance requirements are low because the only moving parts are the centrifugal pumps and a self-cleaning strainer. (Snyder-FIRL)
W78-03202

WASTE TREATMENT PROCESS NOW AVAILABLE IN CANADA.
Water and Pollution Control, Vol. 115, No. 12, p 18-19, December, 1977.

Descriptors: *Oxidation, *Canada, *Industrial wastes, *Organic wastes, *Recycling, Waste water treatment, Pulp and paper industry, Incineration, Sludge disposal, Equipment.

The WETOX waste treatment process has been made available to Canadian industry through the Ontario Research Foundation. The wet-air oxidation process has been used to treat industrial waste streams containing 2-20% organics, producing excess energy for plant operations at concentrations greater than 5%. The process yields sterile products, including water, carbon dioxide, and inorganic materials. Successful demonstrations of wet air oxidation have encompassed the automotive, pulp and paper, steel, textile, oil, and food processing industries. The system is also being evaluated for treatment of military wastes and municipal sewage sludges. (Schulz-FIRL)
W78-03203

RECOVERY AND REUSE OF USEFUL MATERIALS FROM POLLUTANTS OF DYESTUFF INDUSTRY,
Arlabs Ltd, Bhatghar (India).
C. U. Tahiliani.
Indian Chemical Journal, Annual Number, p 99-100, 1977. 1 tab.

Descriptors: *Textiles, *Separation techniques, *Recycling, *Dyes, *Industrial wastes, Chemical wastes, Liquid wastes, Waste water treatment, Dyestuff wastes.

Various aspects of the recovery and reuse of materials from dyestuff manufacturing wastes which may contain vat dyes, solubilized vat dyes, rapid fast and rapidogens, disperse and reactive dyes, and dyestuff intermediates are discussed. Gaseous pollutants such as HBr, H2S, and HCL from the manufacture of dyestuffs are recovered with scrubbers. Liquid pollutants include various organic solvents and concentrated sulfuric acid which may also contain zinc. Solid wastes include sodium zincate, copper sulfide, and lead peroxide. (Schulz-FIRL)
W78-03204

RECOVERY AND REUSE OF MATERIALS FROM DYESTUFF INDUSTRY,
V. J. T. Inst., Bombay (India). Dept. of Public Health Engineering.
B. L. Mahabal.
Indian Chemical Journal, Annual Number, p 97-98, 1977.

Descriptors: *Acids, *Iron compounds, *Recycling, *Dyes, Sludge treatment, Effluents, Industrial wastes, Textiles, Waste water treatment, Organic acids, Waste water disposal, Dyestuff manufacturing wastes, Acetic acid, Sulfuric acid.

Since dye wastes can be resistant to conventional treatment methods and since raw materials, including water, are increasingly more expensive, the recovery of useful materials from dye waste waters has been considered. Although the recovery of the dye itself is not considered feasible because of the varying quality and quantity of dye waste batches, other substances used in dyeing may be recovered. Iron powder is used to produce amino compounds as intermediates in the manufacture of various dyestuffs. The resulting ferrous-ferric oxide sludge can be settled in a sedimentation tank and converted to ferrous and ferric sulfate by reaction with sulfuric acid, another common industrial waste. The recovered iron salts can be used in various processes such as the production of iron oxide pigment. Recovery of sulfuric and acetic acids from dye manufacturing wastes is described. (Schulz-FIRL)

W78-03205

TEXTILE INDUSTRY EFFLUENTS--INSTRUCTIONS FOR PRACTICAL USE (TEXTIL-ABWASSER--WEGLEITUNG FUER DIE PRAXIS).
For primary bibliographic entry see Field 5G.
W78-03206

NEW PROCEDURE FOR TREATING INDUSTRIAL EFFLUENTS AT THE CHEMICAL COMPLEX AT SAINT-FONS, LYON (PROCEDE NOVEAU POUR LE TRAITEMENT D'EFFLUENTS INDUSTRIELS DU COMPLEX CHIMIQUE DE SAINT-FONS A LYON),
H. Esselborn, and C. De Bouille.
La Technique Moderne, No. 3, p 48-49, March, 1977. 1 fig.

Descriptors: *Denitrification, *Pilot plants, *Textiles, *Neutralization, *Biological treatment, Incineration, Aerobic treatment, Chemical wastes, Industrial wastes, *Waste water treatment.

Rhone-Poulenc Industries, Rhone-Poulenc Textiles, and Ciba-Geigy decided to treat in a common installation the wastes produced at their factories. The installation, built jointly by Lurgi S. A. Paris and the Compagnie Internationale des Eaux, is described. Biological treatment is the primary method used, and three pilot plants were established to determine the most effective treatment combinations. Preliminary treatment consists of neutralization, decantation, and homogenization. Aerobic-anaerobic purification combined with denitrification is the second stage, chosen over other biological methods because nitrates can be entirely eliminated; energy savings are realized by using the oxygen from nitrates for biological oxidation; denitrification can be achieved at a slightly acid pH; sludge is reduced by about 15%, thus reducing costs for conditioning and incineration; and the alkalinity produced during denitrification can be used to neutralize residual sulfuric acid. Finally, this two-stage method is more stable than any one-stage biological treatment method. (Blits-FIRL)
W78-03207

CONCENTRATING WOOL CONTAMINANTS.
Water and Waste Treatment, Vol. 20, No. 9, p 52, September, 1977.

Descriptors: *Textiles, Equipment, *Industrial wastes, *Centrifugation, Detergents, Treatment facilities, Separation techniques, Waste water treatment.

The CSIRO division of Textile Industry of Geelong, Australia, has developed a new scouring process for the concentration of wool contaminants in a low-volume, high-solids sludge and for the recovery of wool wax. Conventional techniques for treatment of wool scouring wastes with chemical flocculation are expensive, since the wool wax and dirt suspension in the scouring liquor is extremely stable. For the CSIRO Lo-flo scouring process, the amount of water input to the scouring machine is kept at a minimum to reduce the overall volume of waste water produced. The scour liquor is first heated and passed to a decanter centrifuge for removal of the grease. Detergent is then added and the scour liquor is recycled through the heater, centrifuges, cooler, and mixing tank. Sludge at about 50% solids is produced with the centrifuge and up to 80% of the grease on the wool is recovered by the decanter centrifuge. The Lo-flo unit is marketed as a complete package unit with pumps, flow controllers, heaters, drive motors, and a control panel. (Schulz-FIRL)
W78-03208

'INNOVATIVE' ASSESSMENT TECHNOLOGY ALLOWS MORE ACCURATE PREDICTION.
For primary bibliographic entry see Field 5C.
W78-03209

ECONOMICS OF WASTE DISPOSAL--A CONTRACTOR'S VIEW,
For primary bibliographic entry see Field 5E.
W78-03210

WATER CONSERVATION IN TEXTILE FINISHING,
Tootal Fabric Div. Research, Cheshire (England).
P. A. Rennison.
Americal Dyestuff Reporter, Vol. 66, No. 11, p 48-50, November, 1977. 1 fig.

Descriptors: *Textiles, *Water consumption, *Water reuse, *Costs, *Effluents, Industrial water, Filtration, Bleach wastes, Operation and maintenance, Waste water treatment.

Process modifications and water conservation can be used in the textile industry to lower costs for fuel, waste water treatment and disposal, and water supplies. Although many textile mills still obtain water from municipal sources, increasing demands on municipal water supplies in England have led to the need for alternate supplies for industrial purposes. Much of the water used by the Tootal Fabric Division for industrial purposes. Much of the water used by the Tootal Fabric Division in Tootal, England, is obtained from non-municipal sources and treated by the plant prior to use in dyeing processes. A program was initiated by Tootal to examine all steam and water heating systems with respect to energy conservation. Water conservation and waste treatment practices at three plants operated by Tootal are described. Counterflow washing systems installed at a large print works reduced water consumption by as much as 75%. Various studies are being conducted at the plant to evaluate methods for reducing effluent permanganate levels which had become elevated as a result of reductions in water consumption. Process modifications at a small dyeing and finishing plant reduced the total effluent volume by 40%. (Schulz-FIRL)
W78-03211

ACID MINE DRAINAGE TREATS SEWAGE DUMPED IN STREAMS.
For primary bibliographic entry see Field 5G.
W78-03212

AUTOMATIC WATER-TREATMENT PLANT.
Colliery Guardian, Vol. 225, No. 10, p 794-795, October, 1977. 2 fig.

Descriptors: *Iron compounds, *Mine water, *Lime, *Flocculation, *Coal mine wastes, *Treatment facilities, Coal mines, Automatic control, Water treatment, Coagulation, Neutralization, Industrial wastes, Waste water treatment.

A continuously operating, nearly automatic water treatment plant at the Silverdale Colliery in Newcastle under Lyme, England, is attended only during the daytime, and by one person. It has been fully operational since early 1976, reducing the iron content on 2,600 cu m/day of mine water from about 200 ppm to lower than 2 ppm. The treatment process consists of aeration and chemical precipitation with lime. A rotary-drum, belt-discharge, vacuum filter with cloth washing and discharge facilities is used to dewater the sludge from two NCB deep-cone thickening tanks. Control relays and timers energize the drain pump, the bin activator, lime feed, and the two desludging valves. A portion of the treated water is reused for mining operations. (Snyder-FIRL)
W78-03213

PRE-INSULATED PIPING SYSTEM USED FOR WATER AND TAILINGS AT CANADA'S FIRST ARCTIC MINE.
For primary bibliographic entry see Field 8G.
W78-03214

PURIFICATION PLANT FOR TANNERY EFFLUENTS--INDUSTRIAL APPLICATION (STATION D'EPURATION SUR EFFLUENTS DE TANNERIE-REALISATION INDUSTRIELLE),
B. Vulliermet, and M. Aloy.
La Technique Moderne, No. 1, p 19-20, 23-26, January, 1977. 8 fig, 4 ref.

Descriptors: *Tannery wastes, *Oxidation, *Screens, *Oxidation lagoons, *Centrifugation, Sulfur compounds, Sludge treatment, Industrial wastes, Waste water treatment.

A pilot plant study for treating tannery wastes was undertaken and later applied on a full industrial scale. The goals were to solve problems associated with the usual physico-chemical or biological treatment methods: odors, foaming, final sludge discharge, and corrosion of metal structures. The following estimations were made for the industrial application: at 25 tons/day of salted cowhide and 2500-3000 cu m/day of homogenized effluent, BOD5 would be 700 plus or minus 100 mg/liter, COD 1800 plus or minus 200 mg/liter, and suspended solids 1500 plus or minus 300 mg/liter. A collector measuring 400 m by 800 mm transported effluent to the head of the plant. A description of the plant's operations covers the screening system; the desulfurization process using catalytic oxidation; homogenization and decantation; aerated lagooning in two stages; thickening; and centrifugation. The plant was able to produce a treated effluent containing a maximum BOD5 of 90 mg/liter, maximum COD of 450 mg/liter, and maximum suspended solids of 90 mg/liter. The pH measured 7-7.5 and the toxicity level was at mot 1 mg/liter/Equitox. (Blits-FIRL)
W78-03215

OXYGEN DIFFUSION AND FERMENTATIONS,
Merck Chemical Co., Rahway, NJ.
M. L. King, and J. L. Gainer.
AIChE Symposium Series, Vol. 73, No. 167, p 1-5, 1977. 4 fig, 2 tab, 13 ref.

Descriptors: *Fermentation, *Microorganisms, *Industrial wastes, *Cultures, *Oxygenation, Actinomycetes, Aerobic bacteria, Growth rates, Diffusivity, Permeability, Waste water treatment.

Since industrial fermentation processes are ultimately controlled by the rate at which nutrients are made available to microbial cells, a study was conducted to examine whether the molecular diffusivities of solutes through a solution could be enhanced by the addition of certain compounds such as crocetin. In the studies, crocetin was added to fermentation cultures which contained Bacillis subtilis and Streptomyces griseus in a nutrient broth. Procedures used in sample preparation are described. The studies indicated that the specific growth rate of B. subtilis was not affected by the presence of crocetin below cell concentrations of 10-100 million cells/ml. Above that concentration, however, the crocetin fermentation continued to grow unitl it was at a level 25% greater than the control. With S. griseus specific growth rates were 20-30% greater than that of the control. The use of crocetin to increase oxygen transport and thereby increase microorganism yields in fermentation and waste treatment processes is suggested. (Schulz-FIRL)
W78-03216

INDUSTRIAL EFFLUENT CONTROL AND CHARGES,
For primary bibliographic entry see Field 5G.
W78-03217

ANAEROBIC PROCESSES, (LITERATURE REVIEW),
Institute of Gas Technology, Chicago, IL.
S. Ghosh, M. L. Packer, A. C. Roess, J. R. Conrad, and E. M. VanRyzin.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1019-1040, June, 1977. 125 ref.

Descriptors: *Anaerobic conditions, *Anaerobic digestion, *Microbial degradation, *Nitrification, *Fermentation, Denitrification, Energy, Analytical techniques, Biodegradation, Methane, Sludge digestion, Industrial wastes, Farm wastes, Activated carbon, Soil water-plant relationships, *Reviews, Chemical reactions, *Waste water treatment, *Bibliographies.

Literature pertaining to anaerobic processes in industrial, municipal, and natural waste treatment systems is reviewed. Studies on the microbiology and mechanisms of anaerobic processes encompass anaerobic degradation products of phloroglucinol, fermentative metabolism, digestion of amylose, decomposition of algal material, glucose metabolism, yeast fermentation, analytical procedures, methane generation, environmental effects, biochemical mechanisms in anaerobic digestion, growth rates of anaerobic cultures, and a variety of other subject areas. Studies on anaerobic degradation in soils are reviewed for chlorinated hydrocarbons, mercuric chloride, oil pollutants, and the production of methane and hydrogen sulfide. Various studies on denitrification in natural soil-water systems are described. A survey of laboratory and fullscale studies on waste water denitrification is presented. Recent process developments are reviewed, including the use of anaerobic filters for sanitary landfill leachates, upflow reactors for anaerobic digestion and the effects of activated carbon and various compounds on anaerobic treatment efficiency. Process applications are described for industrial wastes, agricultural wastes, refuse, and the use of anaerobic processes to produce food, fuel, and fertilizer from waste products. (Schulz-FIRL)
W78-03218

ORGANIC BIODEGRADATION IN HYPERSALINE WASTEWATER,
For primary bibliographic entry see Field 5C.
W78-03220

EARTHWORMS TO AID SLUDGE DISPOSAL.
For primary bibliographic entry see Field 5E.
W78-03221

WATER CLARIFICATION BY FLOTATION,
Water Pollution Research Lab., Stevenage (England).
R. A. Hyde, D. G. Miller, R. F. Packham, and W. N. Richards.
Journal of the American Water Works Association, Vol 69, No 7, p 369-374, July, 1977. 4 fig, 2 tab, 44 ref.

Descriptors: *Clarification, *Flotation, *Separation techniques, *Pilot plants, *Water treatment, Waste water treatment, Industrial water, Industrial wastes, Municipal wastes, Coagulation, Design data, Aeration, Foaming, Gravity, Flocculation.

Flotation has been applied to solids separation in the water and waste water treatment industries, as well to mineral processing for metal concentration and for other industrial processes. General processes in water clarification by flotation include bubble generation, bubble attachment, and solids separation. Dispersed-air flotation systems are usually equipped with impellers to disperse, aerate, and agitate the processed liquid for froth flotation with surface-active agents or foam flotation with porous media. In dissolved-air flotation agitation is not employed and bubbles are generally smaller, 0.1 mm or less in diameter, for use in vacuum or pressure flotation. Electrolytic flotation, in which electrolysis is used to generate bubbles, is suggested for use on large volumes of waste water with low concentrations of suspended solids. Previous applications of flotation for water and waste water treatment are reviewed. Laboratory and pilot plant studies at the Water Research Center in England are described. Laboratory studies indicated that flotation was adequate for clarification of natural waters without chemical addition. Pilot plants evaluated clarification of natural waters without chemical addition. Pilot plants evaluated flotation systems consisting of a flash-mixer four-stage tapered mechanical flocculation unit followed by a flotation tank and rapid gravity anthracite-sand filters for treatment of raw water from the Thames River. The Water Research Center is currently conducting full-scale studies at five treatment works in England. (Shulz-FIRL)
W78-03223

GRANULAR MEDIA FILTRATION SAVES TREATMENT COSTS; HELPS MEET EPA STANDARDS,
G. Mace.
Water and Sewage Works, Reference Number, p 70-72, 74-75, April, 1977. 6 fig, 2 tab.

Descriptors: *Filtration, *Porous media, *Filters, Costs, Equipment, Design criteria, Oily water, Operation and maintenance, Suspended solids, *Waste water treatment, Industrial wastes, *Water quality standards, Granular media filtration.

Granular media filters have been used to produce effluents with suspended solids concentrations as low as 1-15 mg/liter. Various aspects of filtration are discussed, including operation, filter sizing and media selection, treatment of backwash waters, and recent innovations in filter technology. The use of multi-media filters such as dual media anthracite-sand filters is described. Five options in granular media filters include vertical gravity, deep media vertical gravity or pressure, horizontal, concrete gravity, and upflow gravity or pressure filters. An economic comparison of vertical gravity, horizontal, and concrete filters at 5000-gpm flow is presented. Considerations in sizing and layout are discussed with respect to the nature of the industrial effluent, maintenance requirements, and filtrate quality. The treatment of backwash waters which contain the entire volume of suspended solids filtered out of the bed is discussed, as well as the recovery of valuable products. Recent design improvements in granular media filters include: a low profile arrangement for shallow media gravity filters; tri-media filters for algae; turbidity meters for filter control; and the use of underdrain nozzles, air metering tubes, and air scouring to remove up to 60 mg/liter oil and 200-250 mg/liter suspended solids. (Schulz-FIRL)
W78-03224

LEATHER TANNING AND FINISHING WASTE MANAGEMENT RESEARCH AND DEVELOPMENT PROGRAM,
Industrial Environmental Research Lab.-Cincinnati, Corvallis, OR. Corvallis Field Station.
J. F. Scaief.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 922, Price codes: A03 in paper copy, A01 in microfiche. Report No. EPA-600/2-76-230, September 1976. 45 p, 2 fig, 1 tab, 24 ref.

Descriptors: *Tannery wastes, *Waste treatment, *Reviews, *Effluents, *Water quality standards, Pilot plants, Recycling, Sludge treatment, Waste water treatment, Waste water disposal.

A state-of-the-art review of research and recent literature on waste management in the leather tanning and finishing industry is presented. EPA-Sponsored projects which are described include the use of activated sludge treatment for chrome tannery wastes, treatment of sole leather vegetable tannery wastes, anaerobic-aerobic lagoon treatment for vegetable tanning wastes, and secondary waste treatment for a small diversified tannery. Waste water management projects outside the jurisdiction of the EPA include studies on tannery effluent control, treatment, water quality, and disposal; water pollution reduction in cattlehide processing; chrome tanning systems; recycling of unhairing liquor; protein recovery from lime-sulfide effluent; alternative approaches to unhairing; liming and tanning without effluent; chemical treatment for beamhouse wastes for a small tannery; effects of flocculants on sedimentation of unhairing effluents; waste water treatment options; and pilot studies on the application of high rate biological filters in the leather tanning industry. On-going EPA projects include studies on aerobic biolgical treatment, sludge dewatering and disposal, and effluent reuse; removal and recovery of sulfide; and leather tannery waste management through process change, reuse, and pretreatment. (Schulz-FIRL)
W78-03225

TREATMENT OF METAL FINISHING WASTES BY SULFIDE PRECIPITATION,
Permutit Co., Princeton, NJ.
R. M. Schlauch, and A. C. Epstein.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 284, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-049, February 1977. 86 p, 11 fig, 11 tab, 7 ref.

Descriptors: *Chemical precipitation, *Sulfides, *Heavy metals, *Calcium hydroxide, *Industrial wastes, Metals, Copper, Cadmium, Nickel, Zinc, Sludge disposal, *Waste water treatment, Waste water disposal.

Heavy metals in metal finishing water were precipitated by the Sulfex process of ferrous sulfide addition and by conventional treatment with calcium hydroxide. Laboratory- and bench-scale tests were performed to determine chemical and physical requirements for the precipitation of the heavy metals and dewatering of the resulting sludges. Pilot plant tests were conducted to confirm the laboratory results and provide operating data. The Sulfex process is technically viable and more effective than conventional calcium hydroxide precipitation for removing copper, cadmium, nickel, and zinc. Operating at pH 8.0-9.0, the Sulfex process results in a total chromium concentration less than or equalling that from conventional hydroxide precipitation. Sulfex can remove hexavalent chromium in one step. Effluent quality from both processes depends on the type and concentration of complexing agents in the influent. (Snyder-FIRL)
W78-03226

INCLINED SCREEN FOR WASTE WATER PURIFICATION (SCHRAEGSIEB ZUR ABWASSERREINIGUNG),
U. Slanina.
Allgemeine Papier-Rundschau, No. 24/25, p 882, 884, June 20, 1977. 2 fig, 2 illus.

Descriptors: *Pulp wastes, *Waste water treatment, *Screens, Filters, Wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Equipment, Water reuse, Closed systems.

The use of the Bauer Hydrasieve in cleaning papermaking effluents in connection with the closing of papermaking water circuits is briefly described. The apparatus includes no moving parts, the liquid/solids separation being effected on a stationary inclined wire screen of special design. (Speckhard-IPC)
W78-03290

FINE SCREENING AT THE INLET--A WAY TO REDUCE CONSTRUCTION AND MODERNIZATION COSTS OF SMALL CLARIFIER INSTALLATIONS (FEINSIEBUNG IM ZULAUF--EIN WEG ZUR SENKUNG VON NEUBAU- UND

SANIERUNGSKOSTEN KLEINERER KLAERANLAGEN),
Morszeck (G.) Engineering Consultants (West Germany).
W. Schottler, and R. Schinke.
Allgemeine Papier-Rundschau, No. 27, p 945-946, July 5, 1977. 1 fig, 1 illus.

Descriptors: *Screens, *Waste water treatment, Municipal wastes, Pulp wastes, Waste treatment, Water pollution treatment, Performance, Equipment, Water pollution control, Wastes.

A brief report is presented on the trial performance of a drum-type screen (trade-named Roto-Klar) in fine screening municipal sewage prior to clarification. The drum-type screen is shown to eliminate the need for a sand trap and a preclarifier basin while improving the operating reliability of the clarifier. Possible use of the screen in treating paper industry effluents is mentioned. (Speckhard-IPC)
W78-03291

TREATMENT AND COMBUSTION OF EFFLUENT SEDIMENT AT THE SVETOGORSK MILL (OPYT OBRABOTKI I SZHIGANIYA OSADKOV STOCHNYKH VOD NA SVETOGORSKOM KOMBINATE),
Svetogorskii Kombinat (USSR).
A. P. Kubenskii, N. P. Panchekhin, Yu. I. Kuklev, and A. I. Kochetkov.
Bumazhnaya Promyshlennost, No. 5, p 25-26, May, 1977. 1 fig, 1 tab.

Descriptors: *Sludge treatment, *Activated sludge, Burning, Wastes, Waste treatment, Water pollution control, Filters, Dewatering, Sludge disposal, Incineration, Solid wastes, Water pollution sources, Pulp and paper industry, Sludge, Lime, Sedimentation, Fly ash, Pulp wastes, Ferric chloride, Soviet Union(USSR).

Equipment for the treatment and combustion of excess activated sludge and sediment from primary and secondary sedimentation tanks has been installed recently at the effluent treatment plant of the Svetogorsk pulp and paper mill. It consists of three vacuum filters, three disk presses, and two furnaces where combustion takes place in a fluidized bed of sand. The mill produces 20,000 cu m of fibrous sediment and 27 tons of excess sludge daily. The excess activated sludge goes to primary sedimentation tanks and is then concentrated in radial thickeners. The sediment with a moisture content of 95-97% goes to the flocculator of the vacuum filter, where ferric chloride and lime are added. The sediment then passes into the vat of the vacuum filter and disk press where its moisture content is reduced to 70-75%. The dewatered sediment is then directed to the furnace (or first to a dryer if its moisture content is too high). The primary air in the furnace is heated with flue gases to 800-900C. The flue gases from the furnace pass through primary air heaters and then are washed to separate the ash. The ash is dewatered to a moisture content of 40-50% in a vacuum filter and conveyed to a dump. The purified gases are released into the atmosphere. (Stapinski-IPC)
W78-03293

WASTE RECOVERY: ZINC RECOVERY FROM RAYON PLANT SLUDGE,
Avtex Fibers, Inc., Front Royal, VA.
L. B. Bowen, J. H. Mallinson, and J. H. Cosgrove.
Chemical Engineering Progress, Vol 73, No 5, p 50-54, May, 1977. 2 fig, 2 tab.

Descriptors: *Zinc, *Sludge treatment, Wastes, Industrial wastes, Water pollution sources, Virginia, Heat treatment, Crystallization, Dewatering, Calcium sulfate, Iron, Chemical precipitation, Corrosion, Sludge, *Rayon, Zinc hydroxide, Zinc sulfide, Zinc sulfate.

In the production of rayon, viscose is spun into a sulfuric acid bath to regenerate the cellulose in fiber form. Zinc sulfate is added to the bath to retard regeneration and allow an increase in the amount of stretch of the fibers. A 7-step process is described for the recovery of Zn hydroxide from the sludge basins at Avtex Fibers Inc. in Front Royal, Virginia. A small dredge feeds sludge from the lagoon into the waste treatment facilities. Following heat treatment at 280-300F to crystallize the amorphous sludge particles, the sludge is dewatered in a filter press. In the solution which is filtered to remove Ca sulfate, organic solids, and other impurities. Finally Fe(II) is oxidized by hydrogen peroxide, precipitated with NaOH, and filtered from the Zn sulfate solution. The filtrate is stored and reused in the rayon plant. Problems with corrosion in the system after the sludge press and blinding of the press cloths are described. (Swichtenberg-IPC)
W78-03295

LOADING OF PROCESS WATER BY DISSOLVED SUBSTANCES DURING PAPER MANUFACTURE. I. SURVEY OF STONE GROUNDWOOD PRODUCTION (UEBER DIE DURCH GELOESTE SUBSTANZEN VERURSACHTE BELASTUNG DES FABRIKATIONSWASSERS BEI DER PAPIERHERSTELLUNG. I. BESTANDSAUFNAHME BEI DER ERZEUGUNG VON STEINSCHLIFF),
Technische Univ., Darmstadt (West Germany). Inst. fuer Paperfabrikation.
For primary bibliographic entry see Field 5B.
W78-03296

METHOD FOR TREATING PULPING EFFLUENT, (IN JAPANESE),
K. Tanaka.
Japanese Patent, Kokai 55701/77. May 7, 1977. 3 p.

Descriptors: *Pulping wastes, *Waste water treatment, *Chemical precipitation, *Patents, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Waste treatment, Iron, Magnesium, Zinc, Aluminum, Calcium, Cations, Polymers, Coagulation, Biochemical oxygen demand, Chemical oxygen demand, Pulp and paper industry, Effluents, *Lignosulfonates, Tin.

Lignin derivatives (such as lignosulfonate salts), water-soluble metallic compounds (Fe, Mg, Sn, Zn, Al, and Ca compounds), and cationic polymers as coagulants are added to the pulping effluent to precipitate out the solid waste. A significant (up to almost tenfold) reduction in BOD and COD can be obtained by this treatment. (Lim-IPC)
W78-03299

THE APPLICATION OF REVERSE OSMOSIS TO THE PRIMARY TREATMENT OF PULP SPENT LIQUOR,
National Taiwan Univ., Taipei. Dept. of Chemical Engineering.
S.-Y. Huang, and T. Chiu.
Journal of the Chinese Institute of Chemical Engineers, Vol. 7, No. 1, p 33-43, 1976. 11 fig, 12 ref, 2 tab.

Descriptors: *Pulp wastes, *Lignins, *Waste water treatment, *Reverse osmosis, *Sulfite liquors, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Membrane processes, Membranes, Separation techniques, Pulp and paper industry, Effluents, Spent sulfite liquors, Lignosulfonic acids, Cellulose acetate.

Laboratory studies were made on the reverse osmosis treatment of lignosulfonic acids and spent liquor. Using cellulose acetate membranes and an average liquid velocity of 1.55 cm/sec, the water flux and salt rejection were 0.5-0.6 cu m/sq m and 97%, respectively. Water flux was increased to 0.75 cu m/sq m by increasing the average liquid velocity to 2.6 cm/sec. Turbulence promoted by fluidization of glass beads within the cell increased the water flux and salt rejection, especially at low liquid velocities. (Buchanan-IPC)
W78-03300

DECOLORIZATION OF KRAFT WASTE LIQUOR WITH WHITE-ROT FUNGI. I. SCREENING OF THE FUNGI AND CULTURING CONDITION FOR DECOLORIZATION OF KRAFT WASTE LIQUOR,
Tokyo Univ. (Japan).
T. Fukuzumi, A. Nishida, K. Aoshima, and K. Minami.
Journal of the Japan Wood Research Society (Mokuzai Gakkaishi), Vol. 23, No. 6, p 290-298, June, 1977. 6 fig, 8 ref, 6 tab.

Descriptors: *Bleaching wastes, *Color, *Fungi, *Waste water treatment, Nutrients, Lignins, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Effluents, Pulp and paper industry, Waste treatment, Pigments, Pulp wastes, Carbohydrates, Ligninolytic fungi, Glucose, Ethanol.

In attempts to decolor kraft bleach plant effluents (especially those from the first alkaline extraction stage after chlorination) by cultivation of ligninolytic fungi, 25 species of tropical white-rot and 10 species of Japanese isolates (Sundmand's test) were screened for color-removing ability. Five fast-growing species (Schizophyllum, Trametes, Ganoderma, Tyromyces, and Tinctoporia) were further evaluated. Tinctoporia species cultivated with addition of saccharides was able to remove 99% of effluent pigments and to brighten the waste liquor to a faint clear yellow. Among different carbon sources tested, glucose or ethanol addition to the effluent gave the best color removal. (Brown-IPCX)
W78-03302

STATE-OF-THE-ART TREATMENT OF WASTES GENERATED BY THE PULP AND PAPER INDUSTRY,
Jordan (Edward C.) Co., Inc., Portland, ME.
B. A. Patrie, and W. H. Parker, III.
New England Water Pollution Control Association Journal, Vol. 10, No. 2, p 145-165, October, 1976. 4 fig, 2 ref, 5 tab.

Descriptors: *Waste water treatment, *Effluents, *Pulp and paper industry, Wastes, Industrial wastes, Pulp wastes, Waste treatment, Water pollution treatment, Water pollution sources, Biochemical oxygen demand, Oxidation lagoons, Aerated lagoons, Activated sludge, Biological treatment, Sludge disposal, Incineration, Color, Lime, Coagulation, Chemical precipitation, Tertiary treatment, Turbidity, Suspended solids, Colloids, Dissolved solids, Flocculation, Ion exchange, Chlorination, Ozone, Nutrients, Sands, Filtration, Spills, Nitrification, Denitrification, Aluminum sulfate, Kraft mills.

This discussion of effluent treatment methods is directed toward the kraft mill. With some modifications these methods may also be economically applied to the neutral sulfite semichemical and sulfite processes in which some form of chemical recovery and combustion of black liquor residues is practiced. Savealls and clarification are used for primary treatment in kraft mills; BOD reduction methods include aerated stabilization basins, activated sludge treatment, and rotating biological surface (disk) systems. Ultimate sludge disposal is by land disposal, incineration, or and external treatment methods. Internal techniques include the Rapson process (completely closed pulp bleaching and chemical recovery system), processes to replace kraft pulping, internal spill control, alteration of the bleaching sequence, and oxygen bleaching. External treatment methods for color reduction include lime treatment, lime mud

treatment, and alum coagulation and precipitation. Advanced waste water treatment systems for removal of turbidity, colloidal and suspended solids, dissolved salts and solids, refractory organics, and nutrients include coagulation and flocculation followed by settling; sand or mixed-media filtration; reverse osmosis, ammonia stripping, biological nitrification-denitrification; ion-exchange; activated carbon treatment, Chlorination; and ozonization. (Witt-IPC)
W78-03303

NEW REFLECTIONS ON CLOSED CYCLES IN THE PAPER AND BOARD INDUSTRY (REFLECTIONS NOUVELLES SUR LES CYCLES FERMES DANS L'INDUSTRIE DU PAPIER ET DU CARTON),
Sulzer Freres S. A., Winterthur (Switzerland).
M. Morgeli.
Papier, Carton et Cellulose, Vol. 26, No. 7, p 34-38, July, 1977. 8 fig, 9 ref.

Descriptors: *Water reuse, Recycling, Pollution abatement, Water pollution control, Foreign countries, Europe, Salinity, Water conservation, Recirculated water, Industrial water, *Pulp mills, *Paper mills, *Board mills, Closed systems.

Closing of water cycles in pulp, paper, and board mills is reviewed and discussed, particularly from the point of view of problems with high salt concentrations and biological activity in the recirculated water. Possibilities for controlling each of these problems are outlined, and an example is described of a Swiss paper mill with closed water cycle. (Speckhard-IPC)
W78-03307

STUDY OF DISSOLVED OXYGEN LEVEL IN PULP MILL EFFLUENTS (SLEDOVANIE KYSLIKOVEHO REZIMU V ODPADOVYCH VODACH Z VYROBY BUNICINY),
Vyskumny Ustav Papieru a Celulozy, Bratislava (Czechoslovakia).
J. Lalik, and L. Balhar.
Papir a Celulosa, Vol. 32, No. 5, p V9-V11, V15, 1977. English summary.

Descriptors: *Pulp wastes, *Bleaching wastes, *Dissolved oxygen, *Reaeration, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Pulp and paper industry, Effluents, Biochemical oxygen demand.

To study effluent reaeration rates, waste waters from magnefite (magnesium-base sulfite) pulping and bleaching (chlorination and alkaline extraction) stages were mixed with BOD test dilution water and placed in beakers equipped with dissolved oxygen (D.O.) probes and mixers. Two mixer velocities were used, corresponding to reaeration rates of 7.89 and 20.86/day, respectively. The test was run for 65 hr during which the D.O. level was recorded. The D.O. vs. time curves, espceially those obtained with bleachery effluents, did not conform to the Streeter-Phelps equation, since they showed two D.O. minima instead of one expected from the Streeter-Phelps equation. (Trubacek-IPC)
W78-03308

PAPER MILL EFFLUENT CLARIFIED WITH IMMOBILIZED ALPHA-AMYLASE,
Agricultural Research Service, Peoria, IL. Northern Regional Research Lab.
K. L. Smiley, B. T. Hofreiter, J. A. Boundy, and S. P. Rogovin.
Proceedings 3rd International Biodegradation Symposium, August 17-23, 1975, Kingston, Rhode Island, p 1001-1011. Published 1976. 3 fig, 16 ref, 2 tab.

Descriptors: *Waste water treatment, *Enzymes, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Suspended solids, Flocculation, Pulp wastes, Pulp and paper industry, Effluents, Waste treatment, Resins, *White water(Paper machines), Alpha-amylase, Aluminum sulfate.

A simulated fine-paper machine white water was treated with alpha-amylase immobilized on an adsorbent resin. Approximately 78% of the suspended solids was removed from the treated white water after settling 4.3 hr following treatment with 75 ppm alum. The process is technically feasible for rendering industrial effluents susceptible to flocculation with nominal levels of alum. Descriptions are given of the simulated white water, amylase immobilization of the protein-adsorbent resin, design of a fluid-bed reactor, and extrapolation of results to mill-scale operations. (Buchanan-IPC)
W78-03310

IDENTIFICATION AND REMOVAL OF TOXIC MATERIALS FROM KRAFT AND GROUNDWOOD PULP MILL EFFLUENT,
B. C. Research Ltd., Vancouver.
J. M. Leach, J. C. Mueller, and C. C. Walden.
Process Biochemistry, Vol. 10, No. 1, p 7-10, January/February 1976. 3 fig, 37 ref, 1 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Toxicity, *Waste identification, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Bleaching wastes, Pulp and paper industry, Effluents, Water reuse, Biological treatment, Aerated lagoons, Microorganisms, Activated sludge, Costs, Suspended solids, Color, Oxygen, Aeration, Activated carbon, Foam separation, *Kraft mills, *Groundwood mills.

Toxic constituents present in kraft and groundwood pulp mill effluents and kraft bleach plant (caustic extraction stage) effluents are briefly reviewed. Since many of the major toxic constituents in pulp mill waste streams are of natural origin, modifications to existing production techniques will probably be of limited benefit in reducing effluent toxicity. Considerable efforts are being made to recycle process waters. However, external waste water treatment is presently the most practical method for toxicity removal at existing pulp mills. Biological detoxification of pulp mill effluents is accomplished by the attack of microorganisms on the toxic substances. Several biological processes, including aerated lagoons, activated sludge systems, Unox process (which uses oxygen in place of air for oxygenating the waste) two-stage Zurn-Attisholz process, and the rotating biological disk system are being investigated or are in use. Activated carbon treatment and foam separation provide alternatives to conventional primary-secondary treatment. Apart from their excessive cost in most instances, these processes usually remove only one sorce of pollution from the waste (e.g., suspended solids, color) and must be used in combination with one or more other processes in order to effect complete treatment. (Witt-IPC)
W78-03311

TWO-STAGE PULP MILL EFFLUENT TREATMENT: CHEMICAL WITH LIME AND BIOLOGICAL BY THE ACTIVATED SLUDGE METHOD (OCZYSZCZANIE SCIEKOW CELULOZOWYCH W UKLADZIE DWUSTOPNIOWYM: CHEMICZNYM - ZA POMOCA WAPNA I BIOLOGICZNYM - METODA OSADU CZYNNEGO),
Technical Univ. of Warsaw (Poland). Inst. Zaopatrzenia w Wode i Budownictwa Wodnego.
M. Apolinarski, M. Roman, Z. Ulaska, E. Skowyrski, and J. Zielinski.
Przeglad Papierniczy, Vol. 33, No. 5, p 178-181, May, 1977. 5 fig, 7 ref, 2 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Activated sludge, *Lime, Wastes, Waste treatment, Industrial wastes, Water pollution treatment, Water pollution sources, Sedimentation, Carbon dioxide, Neutralization, Aeration, Chemical oxygen demand, Color, Biochemical oxygen demand, Pulp and paper industry, Effluents, Biological treatment, Oxygen, Kraft mills.

A study of two-stage effluent purification was conducted in a model installation at the Ostroleka kraft mill during a 6-week period in October-November and 6 weeks in March-April of the next year. The process consists in treatment of the crude effluent with a 10% solution of lime flowing at a rate of 0.4 liter/min, sedimentation during 1.5 hr, saturation with carbon dioxide, 8 hr sedimentation in a secondary sedimentation tank, neutralization, and treatment with activated sludge for an aeration time of 5 hr. The optimum dosage of lime determined in preliminary experiments was 2-3 g/ou dm. The chemical treatment achieved average reductions of 54% in COD, 65% in oxidizability, 88% in color, and 42% in 5-day BOD. The combined purification effect was an 83% reduction of COD, 83% reduction of permanganate oxidizability, 90% reduction of color, and 93% reduction of BOD. Purification with lime, when carried out in a suitable manner, does not affect the subsequent biological process. (Stapinski-IPC)
W78-03312

NEW ENGLAND TISSUE MILL RECYCLES 73% OF ITS WHITE WATER EFFLUENT,
Marcal Paper Mills, Inc., Elmwood Park, NJ.
E. D. Clark.
Pulp and Paper, Vol. 51, No. 9, p 80-82, August, 1977. 1 fig, 1 tab.

Descriptors: *Pulp wastes, *Water reuse, *Water conservation, Industrial water, Wastes, Pulp and paper industry, Effluents, Maine, Costs, Chemicals, Sludge treatment, Dewatering, Suspended solids, Biochemical oxygen demand, Turbidity, Hydrogen ion concentration, Temperature, Polymers, Cations, Oil, Recycling, Flotation, *White water(Paper machines), Tissue paper mills.

The 3 Yankee fourdriniers at Marcal Paper Mills' tissue plant in Mechanic Falls, Maine, use 2.2 million gallons of water/day, but 73% of this is water recycled directly from the effluent treatment plant to the fresh-water storage tank. A schematic diagram is presented of the effluent treatment plant. Two dissolved-air flotation units supplied by Permutit Co. and two 80-inch gravity concentrators (from Ecodyne) with primary and secondary sludge-dewatering screens handle the mill flow completely. The chemical costs for cationic polymer average $85 and $40/day for the flotation units and the concentrator, respectively. Data are presented on the suspended solids, BOD, turbidity, pH, temperature, sludge consistency, and oil and grease contents of treated, untreated, and discharged effluents. (Swichtenberg-IPC)
W78-03313

ROLE PLAYED BY ZETA POTENTIAL IN EFFLUENT TREATMENT AND ITS CONTROL,
Pen Kem Inc., Croton-on-Hudson, NY.
J. G. Penniman.
Pulp and Paper, Vol. 51, No. 9, p 112-115, August, 1977.

Descriptors: *Waste water treatment, *Zeta potential, *Coagulation, *Suspended solids, *Dewatering, *Sludge, Wastes, Waste treatment, Flocculation, Colloids, Iron compounds, Organic compounds, Hydrogen ion concentration, Instrumentation, Polymers, Water pollution treatment, Water pollution sources, Effluents, Aluminum compounds.

The role of zeta potential in the coagulation of suspended solids in the primary and secondary clarifiers and in the dewatering of sludge is investigated. If maximum efficiency is to be obtained in the clarifier, the suspended particle size

must increase rapidly. To accomplish flocculation the negative zeta potential of the colloids is decreased by the addition of primary coagulants (viz., positively charged Al or Fe ions and high-molecular weight organic polymers). Bridging by these coagulants also increases the settling rates. Optimum pH control is important, since zeta potential becomes more positive as the pH is lowered. Instrumentation is described for measuring zeta potential. (Swichtenbery-IPC)
W78-03314

SPECIFIC ENERGY CONSUMPTION FOR ENVIRONMENTAL PROTECTION IN THE (SWEDISH) PULP AND PAPER INDUSTRY: QUESTIONNAIRE RESULT (SPECIFIK ENERGIFORBRUKNING FOR MILJOVARD INOM MASSA-OCHPAPPERSINDUSTRIN: RESULTAT AV EN ENKAT),
IVL-Konsult A. B., Stockholm (Sweden).
For primary bibliographic entry see Field 5G.
W78-03315

BLEACH PLANT FILTRATE RECOVERY,
Erco Envirotech Ltd., London (Ontario). (Assignee).
D. W. Reeve, G. Rowlandson, and W. H. Rapson.
United States Patent No. 4,039,372. August 2, 1977. 10 p, 13 claims, 2 fig.

Descriptors: *Bleaching wastes, *Water reuse, *Patents, Wastes, Industrial wastes, Water pollution sources, Pulp wastes, Pulp and paper industry, Effluents, Neutralization, Pulp washing, Recycling, Pollution abatement, Water pollution control, Sodium hydroxide.

This invention relates to a pulping and bleaching system in which the bleaching and extraction stages yield an aqueous acid filtrate and an aqueous alkaline filtrate, and provides procedures for recycling these filtrates. Part of the acid filtrate is neutralized with fresh aqueous NaOH and used for washing the digested pulp in a washing stage immediately prior to passing the washed pulp to the bleaching system. The remainder of the acid filtrate is introduced as an aqueous medium into the spent pulping liquor recovery cycle (e.g., to the lime kiln scrubber) at a point after burning of the spent liquor, while excluding this remaining acid filtrate from the recycled pulping liquor. Part of the alkaline filtrate is used as wash water for washing the pulp in the earlier stages of the washing system, before the stage using the acid filtrate. The remainder of the alkaline filtrate is used in diluting regenerated pulping liquor to the desired concentration. (Lynch-IPC)
W78-03322

MATHEMATICAL METHODS FOR USE IN PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03420

MIXED INTEGER PROGRAMMING MODELS FOR WATER RESOURCES MANAGEMENT,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W78-03421

CHLORINE INJURY TO FECAL COLIFORM BACTERIA IN TREATMENT PLANT EFFLUENTS,
Montana State Univ., Bozeman. Dept. of Microbiology.
A. K. Camper, and G. A. McFeters.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 676, Price codes: A05 in paper copy, A01 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Research Report Number 86, September 1977. 76 p, 6 fig, 10 tab, 50 ref. OWRT A-099-MONT(1), 14-34-0001-7056.

Descriptors: *Bacteria, *Coliforms, *Chlorine, E. coli, *Waste water treatment, *Chlorination, Absorption, Resipiration, Cytological studies, Fecal coliforms.

Injury induced in E. coli cells by chlorination was studied from a physiological standpoint. The chlorination procedure consisted of exposure of cells directly to 0.5 mg/l chlorine in pH 6.5 water for timed intervals up to sixteen minutes at 22 - 25C. Predictable and reproducible injury was found to occur. The injury inflicted on the E. coli cells by the chlorinated environment was reversible under certain nutrient conditions such as in overlay broth. Oxygen uptake experiments showed that chlorinated cells undergo a decrease in respiration. Uptake of metabolites was inhibited by chlorine injury as shown with experiments using 14C labeled glucose and algal protein hydrolysate. The results indicate that reversible injury occurs in E. coli cells exposed to commonly used concentrations of chlorine. Further, findings suggest that the previously accepted mechanism of chlorine damage (aldolase inactivation through sulfhydryl oxidation) is invalid and that impairment of the normal transport physiology of the cell envelope should be considered. (Stuart-Mont St)
W78-03422

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON NITROGEN TRANSPORMATIONS IN SOIL,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 5E.
W78-03424

WATERHYACINTHS - A NUISANCE OR A BENEFIT,
National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
For primary bibliographic entry see Field 5G.
W78-03443

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE: CHAPTER 5. BASIC PETROCHEMICALS INDUSTRY,
Radian Corp., Austin, TX.
T. B. Parsons, C. M. Thompson, and G. E. Wilkins.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 224, Price codes: A08 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-023e, January 1977. 145 p, 10 fig, 63 tab, 223 ref, 3 append. 1AB015; ROAP21AFH-025, 68-02-1319, Task 34.

Descriptors: *Water pollution, *Chemical wastes, *Industrial wastes, Industrial production, Chemical engineering, Organic compounds, Hydrofracturing, Natural gas, Assessments, Environmental effects, Processes, Petrochemistry, Natural gas liquids, *Petrochemicals industry.

A catalog was developed to aid in defining the environmental impacts of U.S. industrial activity in the basic petrochemicals industry. Entries for the basic petroleum industry include information on companies that treat hydrocarbon streams from the petroleum refining industry, as well as natural gas liquids from the oil and gas reproduction industry. From these raw materials, feedstocks are produced for the organic chemicals industry. The products are pure or mixed chemicals which are used as solvents or chemical intermediates. The basic petrochemicals industry is described by six operations composed of related processes, characterized in four chemical trees, six process flow sheets, and 28 process descriptions for olefins, butadine, benzene/tolunes, naphtalene, cresols and cresylic acids, and normal paraffin. For each process description, available data are presented on input materials, operating parameters, utility requirements, and waste streams. Related information on raw materials, products, and producers of basic petrochemicals with production locations is presented in the appendices. (Wares-IPA)
W78-03457

LABORATORY STUDY OF AERATION AS A FEASIBLE TECHNIQUE FOR DEWATERING FINE-GRAINED DREDGED MATERIAL.
Environmental Engineering Consultants, Inc., Stillwater, OK.
For primary bibliographic entry see Field 5E.
W78-03480

FEASIBILITY STUDY FOR A SEWAGE SYSTEM IN THE CITY OF BLANTYRE IN MALAWI (FEASIBILITY-STUDIE FUER DAS ABWASSERSYSTEM DER STADT BLANTYRE IN MALAWI),
K. Bucksteeg.
Wasser und Abwasser Bau-intern, No 8, p 158-160, 1977. 2 fig.

Descriptors: *Sewerage, *Costs, *Feasibility studies, *Industrial wastes, *Municipal wastes, Sewers, Treatment facilities, Construction, Waste water treatment.

Results are presented on a fact-finding mission in connection with a feasibility study concerning a modern sewage system in Blantyre, Malawi, a rapidly growing city with 165,000 inhabitants and expanding industry. Due to the orographic conditions, the city has three independent sewage systems with waste water treatment facilities for some 75,000 inhabitants. The existing biological waste water treatment plants are over loaded and poisoned by industrial effluents. A considerable and increasing portion of the inhabitants live in huts in areas unsuitable for canalization. The construction of a new sewage system was rejected in view of the high cost (10,000,000 DM). Training of the operating personnel and installation of a waste water laboratory were recommended. (Takacs-FIRL)
W78-03493

PIPEWORK FLEXIBILITY,
For primary bibliographic entry see Field 8G.
W78-03495

GLASS REINFORCED CONCRETE PIPES.
For primary bibliographic entry see Field 8F.
W78-03497

SEWAGE CHANNEL BAR SCREEN RAKE--RAISABLE BY CHAIN ALONG REARWARD SWIVELLING CARRIER ON CANTILEVER WITH POWER CYLINDER DRIVE.
German Patent DS 2524-776. Issued October, 20, 1977. Derwent German Patents Abstracts, Vol. Y, No. 43, p 4, December, 1977.

Descriptors: *Screens, *Patents, *Equipment, *Design data, *Waste water treatment, Filtration, Sewage treatment.

A patent has been issued for a channel bar screen rake which includes a collecting rake mounted at the influent end of a waste water treatment plant. A comb is placed parallel to the rectilinear rake on its downstream side so that the teeth of the comb extend upstream through the rake. The direction of the comb teeth can be reversed to allow cleaning of the mechanism. The rake structure is equipped with a comb support which allows sliding and pivoting of the rake in a downstream direction as well as vertical motion of the comb within its support plane. A cantilever arm with a length equal to the protruding length of the comb teeth from the support is mounted on the downstream side of the support to allow pivoting. (Schulz-FIRL)

W78-03498

REMOVING PHOSPHATES FROM EFFLUENT BY THE ACTIVATED SLUDGE PROCESS--WITH COUNTERCURRENT EXTN. OF THE PHOSPHATE CONTG. SLUDGE.
French Patent ZA 7605-966. Issued August 2, 1977. Derwent French Patents Abstracts, Vol. Y, No. 43, p 3, December, 1977.

Descriptors: *Phosphates, *Activated sludge, *Nutrient removal, *Aeration, *Patents, Sludge treatment, Biochemical oxygen demand, Separation techniques, Waste water treatment.

A patent has been issued for an activated sludge process to remove phosphate from BOD-containing waste water. The phosphate-containing influent is mixed with activated sludge and oxygen-containing gas in an aeration zone. Mixing facilitates the reduction of the BOD content of the influent and the removal of phosphate by microorganisms present in the activated sludge. The phosphate-enriched sludge is separated from the phosphate-free liquid in the mixed liquor and passed to an anaerobic stripping zone for release of the phosphate into the remaining liquid. The phosphate-enriched liquid is withdrawn from the upper section of the stripping zone while the phosphate-depleted sludge is recycled to the aeration zone. The process has been improved through the addition of counter-current stripping of the sludge phosphate by maintaining the sludge in the stripping zone for a period of 2-10 hours. A low phosphate, low solids stripping medium which is added to the lower section of the stripping zone flows up through the settling solids. Phosphate from the settling solids is then transferred to the stripping medium. The stripping medium should have a suspended solids concentration of less than 200 mg/liter and should be introduced at a flow rate of 0.7-2.0 times the rate that the phosphate-enriched liquid is withdrawn. (Schulz-FIRL)
W78-03499

AERATION TANK FOR ACTIVATED SLUDGE TREATMENT OF WASTE WATER--IS SMALLER AND REQUIRES LESS POWER FOR A GIVEN TREATMENT CAPACITY.
French Patent ZA 7605-207. Issued August 31, 1977. Derwent French Patents Abstracts, Vol. Y, No. 43, p 1-2, December, 1977.

Descriptors: *Activated sludge, *Aeration, *Patents, *Equipment, *Sludge treatment, Liquid wastes, Design data, Waste water treatment.

A basin for aerating mixed liquor in an activated sludge system has been patented. The basin consists of an elongated, rectangular tank equipped with inlet and outlet ends. Means for supplying waste water and recycled sludge to the tank are provided. Aerator units are located at various intervals along the length of the basin to aerate the mixed liquor as it flows through the tank to the outlet end. Staggered partitions extend from alternate side walls across at least part of the width of the tank to form liquid passes with a length to width ratio of 0.59-1.70. The liquid flow paths created by the partitions emcompass 30-80% of the wetted cross-sectional area of the basin. The aerator units should have mixing factors within the range of 20-450. The partitioning creates an effect of liquid staging with more than one liquid stage per actual liquid pass. (Schulz-FIRL)
W78-03500

ELIMINATION OF NITROGEN CPDS. FROM WASTE WATER--BY DOWNWARDS PASSAGE THROUGH BIOLOGICAL TREATMENT UNITS IN A SUITABLE ATMOS.
French Patent FR 2336-354. Issued August 26, 1977. Derwent French Patents Abstracts, Vol. Y, No. 43, p 5, December, 1977.

Descriptors: *Nitrification, *Patents, *Equipment, *Nutrient removal, *Nitrogen compounds, Ammonium compounds, Biological treatment, Biodegradation, Anaerobic conditions, Waste water treatment.

A biological treatment process has been patented for the removal of organic nitrogen compounds, nitrates, nitrites, and ammonium compounds from waste water. A pipe conducts the waste water into a distribution chamber and then through a series of superimposed units for the removal of oxygen and the biological reduction of nitrates. The waste water then passes into an evacuated gas distribution chamber where nitrogen is introduced through a tube in a reverse direction to that of the waste water flow. The superimposed units are filled with innoculated porous media which have been treated with a nutrient suitable for supporting nitrifying bacteria. Overflow tubes conduct waste water from one unit to the next in the column. (Schulz-FIRL)
W78-03501

VERTICAL AXIS AERATING ROTOR FOR WASTE WATER--CAN BE OPERATED AT HIGHER SPEEDS THAN PREVIOUS INVERTED CONE TURBINE ROTORS.
French Patents FR 2337-580. Issued September 9, 1977. Derwent French Patents Abstracts, Vol. Y, No. 45, p 3, December, 1977.

Descriptors: *Aeration, *Equipment, *Patents, *Rotors, *Turbine blades, Design data, Hydraulic equipment, Waste water treatment.

A patent has been issued for a high-speed rotor for waste water aeration. The rotor consists of a flat, preferably circular, plate which rotates in a horizontal plane about a vertical axis. The underside of the rotor is equipped with several, angularly spaced blades which extend radially toward the periphery of the rotor. The blade depth is shallowest at the blade's ends, yielding a crescent shape. Each blade is fitted with a wing-like plate which extends from both sides of the blade's crest to its outer edge. The blade itself extends beyond the perimeter of the circular rotor. Four right-angle vertical plates which coincide with the central axis of the rotor act as baffles to prevent turbulence in the lower section of the tank. The rotor can reportedly be operated at higher speeds than conventional inverted cone turbine rotors. (Schulz-FIRL)
W78-03502

STUDIES ON SEPARATION OF ALGAE FROM STABILIZATION POND EFFLUENTS BY COAGULATION,
National Environmental Engineering Research Inst. (India). Zonal Lab.
C. A. Sastry, M. N. Rao, and A. V. Rao.
Journal of the Institution of Engineers (India), Vol. 57, Part EN 3, p 91-94, June, 1977. 8 tab, 6 ref.

Descriptors: *Algae, *Flocculation, *Coagulation, *Feeds, *Nutrient removal, Chemical precipitation, Separation techniques, Polyelectrolytes, Oxidation lagoons, Ponds, Microorganisms, Municipal wastes, Sewage treatment, Waste water treatment.

India's sunny climate and the economy of the process have led to the widespread use of waste stabilization ponds as a means of waste water treatment in India. Algal cell material produced in the ponds is suggested as a source of protein for animal feed supplements. Coagulation of algae in stabilization pond effluents with nirmali (Strychnos potatorum) seed extracts and alum was investigated with effluents obtained from the Shahpura Oxidation Ponds in Bhopal, India. The four 201 x 50 x 1-m ponds are each divided into two equal primary and secondary units and are designed to treat a total of 3 mgd of municipal wastes from Bhopal. Algal species observed in the test effluents are listed. In studies with alum doses of 120-240 mg/liter and effluents containing 250,000-267,000 algae per ml, 95-97% of the algae was coagulated with an alum dose of 240 mg/liter. In studies with flocculation times of 5-30 min, optimum algae removal was obtained with a flocculation time of 20-25 min and a settling time of 30 min. Algae removal was also investigated with polyelectrolytes at doses of 0-10 mg/liter using Magnifloc 990, Separan NP 10, Wisprofloc, and nirmali seed extract. While nirmali seed was more effective than the other agents, polyelectrolytes used alone were not as effective in coagulating algae as the alum. Studies on the use of nirmali seed extract in conjunction with alum indicated that 98-99% removal of algae could be obtained with an alum dose of 180 mg/liter and a nirmali seed extract dose of 8 mg/liter. (Schulz-FIRL)
W78-03504

TREATMENT FACILITIES EXPANDED AT DENVER SEWAGE DISTRICT.
Water and Wastes Engineering, Vol. 14, No. 9, p 94, September, 1977.

Descriptors: *Treatment facilities, *Aerobic treatment, *Sewage treatment, *Screens, *Sludge disposal, Pumps, Clarification, Aeration, Municipal wastes, Methane, Equipment, Waste water treatment.

A $37-million expansion project for the Central Waste Water Treatment Plant was designed by CH2M Hill and Culp Wesner Culp for the Metropolitan Denver Sewage Disposal District No. 1. The project increased the total treatment capacity from 98 mgd to 170 mgd, and increased the primary capacity by 150% and the secondary capacity by 75%. Additions to the primary treatment facility included three continuous rake bar screens and converyor belt; two grit washers and classification units; two hoppers for temporary holding of screenings and grit; two gravity grit basins; four center-feed clarifiers with grease removal; and six piston sludge pumps. Secondary treatment is provided by six vertical propeller low lift pumps, eight three-chambered aeration basins, rim collection clarifiers with grease removal, six pumps for return activated sludge, two pumps for waste activated sludge, and eight aerobic digesters. The aerobic digesters were added to reduce the volume of sludge handled and to stabilize the product for agricultural use. The digesters include a gas mixing system and a heat exchange system, so that methane produced during digestion can be used to maintain a sludge temperature of 95F. The digested/stabilized sludge product from the sludge drying and distribution system will be used as a soil conditioner and fertilizer. (Schulz-FIRL)
W78-03505

DEVELOPMENTS IN THE TREATMENT OF EFFLUENT,
Hudson (Robert) (Raletrux) Ltd., Leeds (England).
A. Waud.
Water Services, Vol. 81, No. 978, p 510, August, 1977.

Descriptors: Equipment, *Screens, *Sludge treatment, *Construction materials, *Design data, Settling basins, Filters, Sewage treatment, Waste water treatment.

A series of tank scrapers and screens has been manufactured by the Effluent Division of Robert Hudson (Raletrux) Ltd. of Leeds, Yorkshire, England. The Auto-Sludge rectangular scraper was developed for use in storm water tanks, sludge holding tanks, primary and secondary settling tanks, and rectangular clarifiers. The scrapers are equipped with a self-contained drive unit, can be totally submerged during operation, and do not require routine maintenance. The Bio-Screen range of solids removal screens and the Roto-

Sludge range of rotating half-bridge scrapers for circular tanks are also produced by Hudson. The Bio-Screen can be used in most shallow channels which are rectangular in cross-section, with either a bar screening surface and rake mechanism or a perforated plate screen surface and brush mechanism. Special features of the Bio-Screen include the adjustable angle of the screen surface and the specially-designed closed circuit winch for removing and elevating screenings. The Roto-Sludge includes a special scum removal device, a tripod central support with a universal bearing arrangement, and a box girder design for the rotating bridge. (Schulz-FIRL)
W78-03506

FERRIC CHLORIDE TREATMENT REDUCES RIVER'S PHOSPHOROUS DISCHARGE,
Indiana Univ. at South Bend. Dept. of Chemistry.
L. L. Garber.
Water and Sewage Works, Vol. 124, No. 10, p 54-57, October, 1977. 2 fig, 5 tab, 16 ref.

Descriptors: *Nutrient removal, *Phosphorus, *Phosphates, *Tertiary treatment, *Water analyses, Monitoring, Water pollution control, Clarification, Flocculation, Rivers, Effluents, Path of pollutants, Waste water treatment.

The effects of the addition of a tertiary system for phosphorus removal to the South Bend waste water treatment plant on the water quality of the St. Joseph River in Indiana were investigated. Concentrations of ortho-phosphate P, polyphosphate P, and organic P were measured in grab and composite samples collected at six sites along the St. Joseph River from September 1974 to August 1975. Phosphorus removal at the South Bend plant was accomplished by precipitation with ferric chloride and flocculation of the produced solids with an anionic polyelectrolyte. The 48-mgd system included two 200-ft dia upflow clarifiers. A typical ferric chloride dosage of 5.8 mg/liter was added to the effluent from the secondary clarifiers. The anionic polyelectrolyte was then added to the waste water as it flowed into the base of the upflow clarifiers. The low variation in phosphorus levels for samples obtained at various sites throughout the city indicated that municipal wastes did not present a significant contribution to the phosphorus levels in the river during dry weather flow. Before the addition of phosphorus removal at the South Bend plant, the treatment plant effluent was reported as increasing the orthophosphate levels in the river by 88%. After the addition of tertiary treatment, plant effluent caused only nominal increases in orthophosphate and organic phosphate levels and a slight decrease in polyphosphate levels. (Schulz-FIRL)
W78-03508

STUDY DISCLAIMS CONTACT STABILIZATION SUPERIORITY OVER SINGLE TANK AERATION,
Nova Scotia Technical Coll., Halifax. Dept. of Civil Engineering.
D. Thirumurthi.
Water and Sewage Works, Vol. 124, No. 10, p 86-93, October, 1977. 4 fig, 12 tab, 16 ref.

Descriptors: *Activated sludge, *Aeration, *Solids contact processes, *Stabilization, Pilot plants, Biological treatment, Sewage treatment, Nutrient removal, Organic wastes, Organic loading, Waste water treatment.

Laboratory-scale studies were used to compare the two-tank aeration activated process (contact stabilization) with the single-tank system (high rate, conventional, and completely mixed processes). Five tests were performed with synthetic waste water and treatment plant influent under batch and continuous conditions. In the first test, contact stabilization was compared with the conventional process. The second and third tests compared the biosorption process with high rate or modified activated sludge process under short-term aeration. The fourth and fifth tests evaluated single-tank and two-tank activated sludge processes under constant and variable hydraulic loads, respectively. Results of the various tests conducted in this study and of previous laboratory and pilot plant investigations are presented. The study concluded that reaeration of the return sludge in a two-tank aeration activated sludge system did not always significantly enhance the BOD or COD removal rates. The single-tank aeration process was better at absorbing mild shocks induced by fluctuating hydraulic and organic loads. The positioning of aeration tanks before and after secondary settling basins offers process flexibility with the use of the reaeration tank as a temporary storage facility. A contact stabilization unit is suggested as resulting in a higher organic load removal per unit volume of aeration tank than a conventional activated sludge process. (Schulz-FIRL)
W78-03509

SLUDGE DEWATERING--A TASK THE RIGHT EQUIPMENT MAKES EASIER.
The American City and County, Vol 92, No 10, p 49-52, October, 1977. 1 fig, 1 tab.

Descriptors: *Dewatering, *Drying, *Sludge treatment, *Filtration, *Filters, Centrifugation, Separation techniques, Lagoons, Design data, Sewage treatment, Waste water treatment.

Various methods are available for dewatering sludge produced during waste water treatment, including rotary vacuum filters, centrifuges, drying beds, lagoons, filter presses, and horizontal belt filters. Vacuum filter performance is related to the type of covering used, the size distribution of solid particles in the sludge, and the cake discharge mechanism employed. Operation of the coil vacuum filter is described. The main variables which affect sludge dewatering by centrifugation include: bowl design, length:diameter ratio, bowl angle, flow pattern, bowl speed, pool volume, conveyor design relative conveyor speed, and sludge feed rate. Various types of centrifuges are discussed, including the solid bowl countercurrent centrifuge, continuous concurrent flow solid bowl conveyor centrifge, basket centrifuges, and disc centrifuges. Design and operating criteria related to drying beds are discussed. Lagoon drying, commonly used in areas where large areas of land are available, is discussed. The filter press, in which sludge is dewatered by compression between vertical plates faced with filter cloth, is discussed. Additional types of dewatering devices which are described include moving screen concentrators, belt pressure filters, capillary dewatering systems, and rotating gravity concentrators. (Schulz-FIRL)
W78-03510

CO-DISPOSAL OF SEWAGE SLUDGE AND SOLID WASTES--IT WORKS,
Environmental Protection Agency, Washington, DC. Resource Recovery Div.
For primary bibliographic entry see Field 5E.
W78-03512

KINETICS OF CELL GROWTH AND BACTERIA PROLIFERATION IN ACTIVATED SLUDGE TREATMENT (A SEJTANYAG, ILLETVE BAKTERIUM-SZAPORULAT KINETIKAJA AZ ELEVENISZAPOS EL-JARASBAN),
F. H. Ghobrial.
Hidrologiai Kozlony, Vol 57, No 5, p 193-198, May, 1977. 4 fig, 3 tab, 10 ref.

Descriptors: *Activated sludge, *Microbial degradation, *Kinetics, *Suspended solids, *Oxidation, Energy, Microorganisms, Sewage treatment, Analytical techniques, Bacteria, Biological treatment, Waste water treatment.

Cell growth and bacterial proliferation in completely-mixed activated sludge systems with batch and continuous operation were examined using activated sludge samples from the South Pest treatment plant in Hungary. A new theoretical approach assumes that bacteria use the energy of substrate oxidation for microbial synthesis with only limited effciency, and that part of this energy leaves the system in the form of heat. The studies concluded that bacterial growth, the biological use effciency of the energy produced, and the endogenous decay factor were constant under the same physical and chemical conditions. Measurements of mixed liquor suspended solids were considered to be more practical and more easily obtained than measurements of live bacterial mass. (Schulz-FIRL)
W78-03513

HIGHLY ADVANCED SEWAGE TREATMENT (HOCHENTWICKELTE ABWASSER-REINIGUNG).
Wasser, Luft, und Betrieb, Vol 21, No 7, p 405-406, 1977. 3 fig.

Descriptors: *Tertiary treatment, *Filtration, *Filters, *Treatment facilities, *Equipment, Design data, Municipal wastes, Biochemical oxygen demand, Phosphorus, Effluents, Biological treatment, Waste water treatment.

Percolation bodies made of PLASdek blocks and their uses in municipal waste water treatment are described. The percolation bodies consist of blocks measuring 1,200 mm x 600 mm x 500 mm. They can be used for high-efficiency purification of municipal waste water, especially where chemical precipitation is required. The bacterial flora is rapidly regenerated after chemical attack. Two-stage percolation bodies with fixed nozzle or rotary disk water distribution systems have an efficiency of 90% and over in terms of the reduction of BOD and phosphorus contents. (Takacs-FIRL)
W78-03514

CENTRIFUGAL DEWATERING OF MUNICIPAL AND INDUSTRIAL SLUDGE,
Washington State Univ., Pullman.
For primary bibliographic entry see Field 5E.
W78-03515

REST AREA WASTEWATER TREATMENT,
B. N. Lord, and G. W. Hughes.
Public Roads, Vol 41, No 2, p 53-57, September, 1977. 1 fig, 2 tab.

Descriptors: *Roads, *Public lands, *Recreation wastes, *Recreation facilities, *Sewage treatment, Treatment facilities, Septic tanks, Oxidation, Design criteria, Operation and maintenance, Waste water treatment.

In light of the number of rest areas associated with the Interstate Highway System, a study was conducted by the Federal Highway Administration to develop recommendations and guidelines for bringing existing and new rest area sanitary waste water treatment systems into compliance with the Federal Water Pollution Control Act. In the first phase of the two part study, existing treatment systems were surveyed to study types, sizes, operational characteristics, and design parameters of rest area sewage treatment systems; to evaluate the abilities of existing systems to comply with 1977 requirements; and to determine current state requirements for rest area waste water treatment. Discharge of rest area wastes was the preferred method of treatment by state highway agencies. The most common methods of treatment in use at existing rest areas were septic tanks with leach fields or sand filters, oxidation ponds, and extended aeration activated sludge package plants. A regional breakdown of rest area sewage treatment systems which were surveyed is presented. Since federal regulations require that publicly owned

treatment facilities meet requirements for secondary treatment for all point source discharges by July 1, 1977, design and operating guidelines and procedures for new facilities, as well as upgrading procedures for existing facilities, were developed in the second phase of the program. (Schulz-FIRL)
W78-03516

THE EFFECT OF SLUDGE DIGESTION ON VIRUS INFECTIVITY,
Royal Veterinary and Agriculture Coll., Copenhagen (Denmark). Dept. of Virology and Immunology.
For primary bibliographic entry see Field 5C.
W78-03517

AWARD WINNING PLANT UTILIZES SPRAY IRRIGATION,
Dufresne-Henry Engineering Corp., North Springfield, VT.
For primary bibliographic entry see Field 5E.
W78-03519

TURBINE STANDBY FOR WATER AND SEWAGE PLANTS.
For primary bibliographic entry see Field 8C.
W78-03520

THE STATUS AND FUTURE OF OZONE FOR WATER AND WASTEWATER TREATMENT,
Environmental Protection Agency, Washington, DC. Office of Research and Development.
W. J. Lacy, and R. G. Rice.
Industrial Water Engineering, Vol 14, No 5, p 14-19, September, 1977.

Descriptors: *Ozone, *Disinfection, *Activated carbon, *Industrial wastes, *Municipal wastes, Oxidation, Chlorination, Toxicity, Hospitals, Chemical wastes, Organic wastes, Activated sludge, Aeration, Waste water treatment.

Current and prospective applications of ozone in water and waste water treatment are described. Although chlorination has been the traditional means of disinfection in sewage treatment, the potential toxic effects of chlorine to aquatic life have led to the consideration of ozone as an alternative. Sewage treatment plants in the United States which have used ozone as of 1977 are listed. The use of ozone in the oxygen-activated sludge process and in the removal of total coliforms, viruses, and dissolved solids is described. Pilot plant studies on the use of ozonation prior to activated carbon adsorption have indicated that ozonation can increase removals of dissolved organic carbon compounds, prolong the life of the carbon bed, and result in odor reduction. Current research into the substitution of ozonation for chlorination in water treatment is discussed. Current industrial applications of ozone are examined for the destruction of cyanides and polychlorinated biphenyls and for the treatment of photo-processing, military hospital, and power plant cooling waste waters. Future potentials for ozonation in the United States are evaluated. (Schulz-FIRL)
W78-03521

ENERGY GUZZLING SEWAGE PLANT WILL FUEL ITSELF.
Engineering News-Record, Vol 199, No 14, p 70-72, 76, October, 1977. 1 fig.

Descriptors: *Energy, *Fuels, *Recycling, *Costs, Water reuse, *Incineration, Dewatering, Sludge treatment, Sludge disposal, Waste water treatment.

A $70-million physical-chemical-biological waste water reclamation plant has recently been put into operation in Pacheco, California, by the Central Contra Costa Sanitary District. The facility is designed to treat an average flow of 30 mgd, of which 19 mgd are then recycled to five nearby industries for use as cooling and process water. A 1000-tpd front end resource recovery facility will produce about 605 tpd of refuse-derived fuel, as well as separate out reusable metals and glass. The refuse-derived fuel will be mixed with organic sludge and used to fuel multiple-hearth furnaces which have been modified for pyrolysis. A portion of the resulting combustible gas will be used to run the lime recovery furnace while the rest will be burned in afterburners to produce steam in waste heat boilers for 90-95% of the plant's energy needs. In addition, the recovery operation is expected to save $2,275 per day in lime costs. Before passing to the multiple-hearth furnaces, the sludge is first dewatered in two centrifuges to render a moisture content low enough for autothermic burning of the sludge. Designed by Brown and Caldwell Consulting Engineers of Walnut Creek, California, the plant is expected to more than pay back its high initial cost in fuel savings. (Schulz-FIRL)
W78-03522

EXPANSION PROGRAM GIVEN 'GO AHEAD' IN ABSENCE OF FEDERAL FUNDS,
Williams and Works, Grand Rapids, MI.
T. C. Williams.
Water and Wastes Engineering, Vol 14, No 10, p 33, 35-37, October, 1977. 1 fig.

Descriptors: *Return flow, *Treatment facilities, *Sewage lagoons, *Waste water treatment, Water treatment, Costs, Aeration, Sewerage, Municipal wastes.

With the discovery of oil and the construction of multi-million-dollar refinery in Kalkaska, Michigan, a rapid influx of new residents had seriously overloaded water and waste treatment facilities. Additions to the existing waste treatment system which consisted of a stabilization lagoon with provisions for seepage and semi-annual discharge to the Boardman River had been prohibited by the State Department of Natural Resources, The ban was later lifted after the installation of aerators, on the condition that Kalkaska would initiate a project to alleviate the overloading. Since federal funds were not available to Kalkaska's low priority project, the city council voted to intitiate a $1.3-million program to expand water and sewer systems without grant assistance. The Farmers Home Administration provided funds for local bonds to finance the project. The Farmers Home Administration provided funds for local bonds to finance the project. The water system expansion included construction of a new 700-gpm well; a 250,000-gal elevated storage tank; and approximately 4 miles of distribution mains. Expansions for waste water collection and treatment included construction of additional stabilization ponds, irrigation areas to eliminate the need for a direct discharge to the Boardman River, and approximately 4 miles of collection sewers. (Schulz-FIRL)
W78-03523

SLUDGE COMPOSTING PROJECTS IN U.S. CITIES,
Agricultural Research Service, Beltsville, MD. Biological Waster Management Lab.; and Agricultural Research Service, Beltsville, MD. Soil Nitrogen Lab.
For primary bibliographic entry see Field 5E.
W78-03525

IRRADIATING DRIED SLUDGE COULD BENEFIT ENVIRONMENT, SAVE ENERGY.
Design News, Vol 33, No 19, p 42, October, 1977.

Descriptors: *Radiation, *Sludge treatment, *Disinfection, *Sewage bacteria, Sewage treatment, Irradiation, Waste water treatment.

Sandia Laboratories in Albuquerque, New Mexico, has designed a pilot facility to examine the economic and scientific aspects of treating dried sewage sludge with gamma radiation as a means of disinfecting sludge for use as a fertilizer or soil conditioner. The facility which is being built for ERDA will handle dried sludge on a continuous, flow-through basis rather than on a batch system operation. From 30 to 60 lbs of dried sludge will be placed in each of a series of conveyor-suspended buckets. The 10' high, 12' wide, and 24' long buckets will pass over a under a gamma-radiation source of one megacurie of cesium-137, a waste product of nuclear power reactors. Twenty sludge-filled buckets can occupy the radiation zone at any given time, and the radiation dosages can be varied from a few thousand rads up to several million rads by adjustments of the conveyor belt speed. The method of treatment is suggested as an effective means of disinfection which would also put to beneficial use considerable amounts of cesium-137. (Schulz-FIRL)
W78-03526

TANK ACCESSORIES IN PLASTIC.
For primary bibliographic entry see Field 8G.
W78-03528

SANITATION FOR THE DEVELOPING NATIONS.
Compost Science, Vol 18, No 5, p 21, September/October, 1977.

Descriptors: *Sewage treatment, *Foreign countries, *Septic tanks, *Domestic wastes, *Municipal wastes, Waste water treatment, Absorption, Soil disposal fields, Treatment facilities.

Methods of household waste treatment and disposal which are available to developing nations where traditional methods of sewage treatment would otherwise not be feasible are reviewed. The possibilities include bucket toilet collection systems, pit privies, communal latrines, composting toilets, septic tanks, sewage ponds, and aqua privies. Problems with public health dangers from bacteria, viruses, and parasites have led to the development of a new toilet system by the Vietnamese government. The system is actually a 'double septic tank' or a double vault toilet in which urine is separated off to soak into the ground and feces are passed to a masonry vault. One of the two units is used while the other is sealed off for a period of 45 days to produce a nutrient-rich, odorless material for use as a fertilizer. A second double vault system developed by Dr. Krisno Nimpuno of Mozambique allows the use of a small amount of flushing water to cleanse the opening. Aerobic decomposition is maintained by a filter of leaves, charcoal, and crushed limestone which lets liquids as well as kitchen garbage soak through the soil. Additional methods for waterless waste treatment and disposal are described. (Schulz-FIRL)
W78-03530

INCREASE IN STANDBY GENERATION.
For primary bibliographic entry see Field 8C.
W78-03531

COMPARISON OF BENCH, PILOT, AND FULL SCALE CARBON ADSORPTION/FILTRATION,
Schade (Willard F.) and Associates, Inc., Cleveland, OH.
W. H. Moss, and S. J. Sebesta.
AIChE Symposium Series, Vol 73, No 166, p 78-90, 1977. 9 fig, 6 tab, 9 ref.

Descriptors: *Activated carbon, *Adsorption, *Filtration, *Pilot plants, *Operation and maintenance, Treatment facilities, Biochemical oxygen demand, Municipal wastes, Clarification, Sewage treatment, Waste water treatment.

The 10-mgd Rocky River waste water treatment plant in Ohio was the site of a study to compare full scale results of a carbon adsorption/filtration process with previous bench and pilot scale studies. Bench scale studies were conducted on a scale of 0.5 gal/min and pilot scale studies on a scale of 50 gal/min. Carbon treatment performance was measured in terms of suspended solids, 5-day BOD, COD, and total phosphorus in the carbon column effluent. In addition to filtration and adsorption performance, hydrogen sulfide production in the column and column pressure loss and backwashing were evaluated for each carbon adsorption/filtration system. Results indicated that bench-scale studies are not a reliable measure of performance on a larger scale and that the carbon/adsorption filtration process was a solids limited process when applied to the treatment of chemically clarified domestic waste water. Surface filtration was the main result of treatment with an 8 x 30 mesh carbon. Adsorption efficiency was reduced by diurnal variations in flow. Hydrogen sulfide formation was effectively suppressed with the addition of sodium nitrate to the carbon filters. Biological activity was cited as the primary cause of high column headloss. (Schulz-FIRL)
W78-03532

UPFLOW-DOWNFLOW CARBON ADSORPTION,
Zurn Industries, Inc., Erie, PA. Eviro-System Div.
G. E. Strudgeon.
AIChE Symposium Series, Vol 73, No 166, p 43-53, 1977. 10 fig, 1 tab, 4 ref.

Descriptors: *Activated carbon, *Adsorption, *Filtration, *Industrial wastes, *Municipal wastes, Equipment, Porous media, Heat treatment, Waste water treatment.

An upflow-downflow carbon adsorption system developed by the Enviro-Systems Division of Zurn Industries, Inc., of Erie, Pennsylvania, has been chosen by the city of Garland, Texas, for the treatment of combined municipal and industrial wastes. The system includes series-connected columns of activated carbon which were designed to reduce the number of times the carbon must be regenerated by extending the column service cycle. The counter-current, two-bed system is arranged so that one of the beds acts as a series roughing upflow primary contactor, while the other acts as a secondary downflow polishing contactor. When the effluent quality has deteriorated to a predetermined level, the spent carbon from the secondary unit replaces the carbon in the primary unit to maximize carbon utilization. In the series operation, loadings of 0.6-0.7 lbs COD/lb carbon are possible as compared to loading rates of 0.3-0.4 lbs COD/lb carbon under parallel conditions. Costs and expected treatment efficiency are presented for a 30-mgd plant which uses lime clarification prior to activated carbon adsorption. Carbon adsorption facilities at the 30-mgd Duck Creek sewage treatment plant in Garland, Texas, will include twenty 25-ft dia columns. Carbon replacement will be required approximately every 2-4 days with regeneration in a multiple hearth furnace. (Schulz-FIRL)
W78-03533

GREYWATER FOR THE GREENHOUSE,
Clivus Multrum Inc., Cambridge, MA.
A. Rockefeller, and C. Lindstrom.
Compost Science, Vol 18, No 5, p 22-25, September/October, 1977.

Descriptors: *Soil disposal fields, *Domestic wastes, *Greenhouses, *Return flow, *Nutrient removal, Fertilizers, Waste water disposal, Waste water treatment, Sludge treatment, Irrigation practices, Soil-water-plant relationships.

Kitchen and toilet wastes can be separated from other household wastes to yield 'greywater', which is easier to treat than combined wastes and can be used for other purposes. A closed cycle of organic waste conversion/water purification/food production consisting of a Clivus Multrum, a Lindstrom roughing filter, and a lean-to greenhouse is described. Kitchen and toilet wastes in the Clivus are converted to a humus soil for the greenhouse growing beds. The stone roughing filter is used to treat household waste water for pumping into the 4- x 2-ft greenhouse soil boxes. The relatively stable and warm temperature in the greenhouse, along with the nutrient uptake by the plants, affords favorable conditions for the activity of decomposing organisms and for the purification of household waste waters. Since the amount of water introduced to the greenhouse beds is considerably more than the amount that the plants can transpirate, waste water application is actually more of a hybrid between standard subsurface irrigation and hydroponics. At the test site in Cambridge, Massachusetts, waste heat from a central gas furnace is used as a back-up heat source for the greenhouse. Crushed rock under the concrete slab floor and the warm greywater also help maintain constant temperatures in the greenhouse. (Schulz-FIRL)
W78-03534

WASTEWATER RENOVATION AND SLUDGE UTILIZATION ON LAND INCLUDING QUESTIONS OF OWNERSHIP,
Environmental Protection Agency, Chicago, IL. Office of Research and Development.
For primary bibliographic entry see Field 5E.
W78-03535

ELASTOMERIC MEMBRANES,
Dunlop Ltd., Skelmersdale (England). GRG Div.
For primary bibliographic entry see Field 8G.
W78-03536

WATER RECLAMATION AND REUSE, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, OH.
J. N. English.
Journal Water Pollution Control Federation, Vol 49, No 6, p 1078-1087, June, 1977. 128 ref.

Descriptors: *Water reuse, *Tertiary treatment, *Industrial water, *Return flow, Environmental effects, Fertilizers, Irrigation practices, Municipal wastes, Recycling, Waste water disposal, Waste water treatment, *Bibliographies.

Various literature pertaining to waste water reclamation and reuse is reviewed. Water resources planning and management practices which incorporate reuse are described. Experiences with the use of municipal waste water and organic wastes for irrigation, fertilization, and groundwater recharge are discussed with respect to costs and effects. Models to assess the reuse of waste water for artificial recharge and to prevent salt water intrusion into coastal aquifers are described. The use of municipal waste water for industrial purposes is examined. In-plant recycling and closed-loop systems for process waste water are reviewed for various industrial applications. Renovation of waste water to augment potable water supplies and the associated health effects are discussed. Recent technology developments in waste water reclamation are described. (Schulz-FIRL)
W78-03537

ACTIVATED SLUDGE TREATMENT, GENERATION, AND DISPOSAL,
Delaware Univ., Newark.
R. I. Dick.
AIChE Symposium Series, Vol 73, No 167, p 66-77, 1977. 2 fig, 61 ref.

Descriptors: *Activated sludge, *Environmental effects, *Sludge treatment, *Sludge disposal, Recycling, Municipal wastes, Feeds, Incineration, Dewatering, Equations, Legislation, Equipment, Waste water treatment, Nutrient removal, Waste water disposal.

Various aspects of the activated sludge process in waste water treatment are reviewed. Mathematical expressions for the amount of excess activated sludge produced at a waste water treatment plant are presented. The chemical, biological, and physical properties of waste activated sludge which may influence selection of treatment and disposal techniques are discussed. Previous studies on the treatment of waste activated sludge in combination with other sludges at a waste water treatment plant are reviewed. Reclamation of valuable substances in sludge is discussed with respect to food processing wastes, the production of animal feed supplements from municipal wastes, and the use of processed activated sludge for various agricultural purposes. Since sludge constituents which are not recycled must be returned to some sector of the environment, the effects of sludge disposal on water, air, and land are discussed. Legislation and technology related to sludge disposal practices are described. Sludge thickening, stabilization, conditioning, and dewatering methods are reviewed. (Schulz-FIRL)
W78-03538

ADVANCED WASTEWATER TREATMENT PROCESSES AT COLESHILL,
Humphreys (Howard) and Sons, Leatherhead (England).
F. Clough.
Chemistry and Industry, Vol 20, p 811-816, 1977. 2 ref.

Descriptors: *Tertiary treatment, *Activated carbon, *Lime, *Adsorption, *Treatment facilities, Design data, Filtration, Porous media, Suspended solids, Waste water treatment.

The advanced waste water treatment facilities in Coleshill, England, contain two complete treatment streams, each capable of handling average flows of 450 cu m/day with peaks of 1350 cu m/day for a total equivalent population of 5,000. One of the treatment streams was used in an evaluation of conventional physicochemical treatment with lime addition, settling, first stage recarbonation, settling, second stage recarbonation, media filtration, and activated carbon treatment. The evaluation was conducted to provide information on costs for individual and combination processes. A major advantages of lime addition is greater removal of suspended solids and BOD to reduce settling costs, although the quantity of sludge is increased and costs are incurred by the need for chemical storage and dosing facilities. When lime has been added, two-stage recarbonation is required to adjust the pH prior to activated carbon treatment. Because of its regenerating capacities, granular instead of powdered carbon is used in the activated carbon stage at Coleshill. Properties of activated carbon and operation and maintenance of the adsorption columns are described. The media filtration plant at Coleshill includes three anthracite-sand-gravel filters which can be used singly or in combination. The activated carbon plant includes three pairs of adsorption columns, sewage pumping and backwash equipment, and carbon storage facilities. (Schulz-FIRL)
W78-03539

PURIFICATION OF MUNICIPAL WASTE WATER WITH ACTIVATED CARBON AFTER WEAKLY LOADED BIOLOGICAL TREATMENT AND FILTRATION (REINIGUNG VON KOMMUNALEM ABWASSER MITTELS AKTIVOKHLE NACH SCHWACH BELASTETER BIOLOGISCHER REINIGUNG UND FILTRATION),
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserrinigung und Gewaesserschutz, Zurich (Switzerland).
P. Roberts, W. Gujer, and J. Eugster.

Vom Wasser, Vol 48, p 47-70, 1977. 13 fig, 9 tab, 9 ref.

Descriptors: *Activated carbon, *Adsorption, *Filtration, *Organic wastes, *Particle size, Porous media, Tertiary treatment, Effluents, Biodegradation, Municipal wastes, Gas chromatography, Analytical techniques, Waste water treatment.

Advanced treatment of municipal waste water is often required in Switzerland for compliance with water quality standards on dissolved organic carbon levels in effluents. The effects of operating parameters, including the brand of activated carbon, grain size, and filtration rate, on the fixed bed absorption were investigated in pilot-scale studies. Additional parameters observed during the studies included activated carbon capacity, concentration profiles, and adsorption performance. The degree of biodegradation of organic compounds during activated carbon treatment was evaluated with respect to the oxygen consumption in the carbon bed. Gas chromatography was used to examine the removal of specific organic substances by adsorption onto activated carbon. (Schulz-FIRL)
W78-03540

RECENT ADVANCES IN SEWAGE EFFLUENT DENITRIFICATION: PART I,
Water Pollution Research Lab., Stevenage (England).
P. F. Cooper, E. A. Drew, D. A. Bailey, and E. V. Thomas.
Journal of the Institute of Water Pollution Control, Vol 76, No 3, p 287-300, 1977. 8 fig, 6 tab, 17 ref.

Descriptors: *Activated sludge, *Denitrification, *Pilot plants, *Nutrient removal, *Anaerobic conditions, Nitrogen compounds, Ammonia, Sludge treatment, Waste water treatment.

Results of an investigation by the Water Research Centre in England on denitrification in sewage treatment are presented. A modified activated sludge system with four compartments connected in series was used in studies to compare nitrogen removal by conventional activated sludge processes and by a modified activated sludge unit. The differences in removal of BOD, COD, and organic carbon between the two systems were insignificant. Nitrogen removal for the modified unit was 58-88% as compared with 35-45% for the conventional unit. Large-scale testing of the modified process was conducted at the Rye Meads sewage treatment works. An anaerobic zone was created in the first of four units with a four-pass plug-flow diffused-air activated sludge treatment unit. Total nitrogen was successfully reduced from 40.4 mg/liter to 21.2 mg/liter. Three additional units were connected in series. Performance of the individual units is compared in terms of reductions in ammonia and oxidized nitrogen. The percentage reduction of oxidized nitrogen was 47.7% for the first unit, 48.5% for the second unit, 52.9% for the third, and 53.7% for the fourth. (Schulz-FIRL)
W78-03541

LISNASKEA SEWAGE-TREATMENT WORKS,
Kirk, McClure and Morton, Belfast (Ireland).
W. I. D. Sanderson.
Journal of the Institute of Water Pollution Control, Vol 76, No 3, p 332-339, 1977. 1 fig, 3 tab, 2 ref, 1 append.

Descriptors: *Dairy industry, *Tertiary treatment, *Activated sludge, *Settling basins, Aerobic digestion, Clarification, Treatment facilities, Municipal wastes, Industrial wastes, Sewage treatment, Aeration, Design data, Waste water treatment.

The Lisnaskea sewage treatment facility in County Fermanagh in Ireland is described. The system treats combined municipal and industrial wastes for a design population equivalent of 8,000. Treatment at the Lisnaskea plant includes a double stage pretreatment system with interstage sedimentation with Flocor towers to reduce the influent BOD concentration from a maximum of 1,500 mg/liter to a maximum of 300 mg/liter. Treatment of domestic sewage which may contain storm water includes grit removal with a Pista grit trap. The pretreated combined industrial and municipal wastes are pumped to the activated sludge plant by means of three centrifugal pumps. Preaeration mixing tanks are used to minimize the effect of shock loadings from dairy effluent. The main aeration tanks for combined wastes are serviced by a fine-bubble diffused-air system. Aerated effluent is transferred to secondary sedimentation tanks and then to tertiary upflow clarifiers. Aerobic digestion tanks are used to treat surplus sludge from the activated sludge plant. Sludge from the aerobic digestion tanks is settled in sludge consolidation tanks and piped to one of four drying beds. The BOD of domestic sewage is reduced in the final effluent from 254.9 mg/liter to 9.7 mg/liter, and the suspended solids from 222.4 mg/liter to 11.9 mg/liter. The industrial effluent pretreatment plant reduces influent BOD from 1,116 mg/liter to a concentration of 289 mg/liter in the effluent. Suspended solids are reduced from 439 mg/liter to 63 mg/liter. (Schulz-FIRL)
W78-03542

LOAD BALANCING AT SEWAGE-TREATMENT WORKS: THE SOUTHAMPTON UNIVERSITY PILOT PLANT AT MILLBROOK,
Southampton Univ. (England). Dept. of Civil Engineering.
P. R. Helliwell, and R. J. R. Reed.
Journal of the Institute of Water Pollution Control, Vol 76, No 3, p 355-372, 1977. 14 fig, 2 tab, 10 ref.

Descriptors: *Treatment facilities, *Pilot plants, *Equalizing reservoirs, *Automatic control, *Design data, Diurnal distribution, Flow control, Electronic equipment, Computer programs, Kinetics, Activated sludge, Biochemical oxygen demand, Mathematical models, Sewage treatment, Automation, Monitoring, Waste water treatment.

Load balancing in sewage treatment was investigated with a 45.4-cu-m/day pilot plant at Southampton University in Millbrook, England. The design of the pilot plant follows that of a conventional treatment plant with a diffused-air activated sludge system with the addition of an off-line balancing tank. Design data are presented for the primary sedimentation tank, activated sludge thickening tank, off-line balancing tank, aeration tank, and construction and materials. Control systems which are described include: load balancing control, influent flow control, level control, instrumentation, fail-safe arrangements, and the reactivated sludge rate. Measurements for measuring organic strength are described. Aspects of process kinetics which are discussed include: study and variable flow rates, steady and variable concentration, steady and variable load, the plug flow reactor, and the continuous stirred tank reactor. The effects of load balancing on flow, BOD, and load variations in primary and final effluents are discussed. A flow diagram for a computer program to regulate operations of a load balancing system is presented. (Schulz-FIRL)
W78-03543

BIOLOGICAL DECOMPOSITION OF REFRACTIVE COMPOUNDS AFTER CHEMICAL OXIDATION (BIOLOGISCHER ABBAU REFRAKTAERER VERBINDUNG NACH CHEMISCHER OXIDATION),
Bundesgesundheitsamt, Berlin (West Germany). Inst. fuer Wasser-, Boden-, und Lufthygiene.
W. Janicke.
Gesundheits-Ingenieur, Vol 98, No 7/8, p 208-212, 1977. 2 fig, 71 ref.

Descriptors: *Oxidation, *Chlorination, *Ozone, *Disinfection, *Biodegradation, Organic wastes, Biological treatment, Chemical reactions, Chemical degradation, Surfactants, Waste water treatment.

The chemical oxidation of stable tensides, such as tetrapropylenebenzenesulfonate (TBS) and nonylphenolethoxylate (NPE) by chlorination and ozonation, and its effect on the efficiency of the subsequent biological waste water treatment were studied under laboratory conditions. The tenside concentration in the water was about 4.8 g/liter for ozonation for 2.5 or 8 hr. The flow rate of the ozone-containing oxygen was about 200 liter/hr for TBS, and 80-100 liter/hr for NPE. The pH was maintained at the neutral point. Chlorination was performed at 10C with weak chlorine gas current for 5 hr, or with chlorinated water for 30 min. Ozone had only slight effect on TBS and on the subsequent biological treatment, while it oxidized NPE effectively and increased the efficiency of the biological treatment by about 100%. Chlorine oxidized NPE more effectively than TBS, but it also increased the efficiency of the biological degradation of the latter. (Takacs-FIRL)
W78-03544

THE PURIFICATION OF DOMESTIC WASTE WATER BY MEANS OF ACTIVATED CARBON AFTER LOW LOADING BIOLOGICAL TREATMENT AND FILTRATION (REINIGUNG VON KOMMUNALEM ABWASSER MITTELS AKTIVKHOLE NACH SCHWACH BELASTETER BIOLOGISCHER REINIGUNG UND FILTRATION),
Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland).
P. Roberts, W. Gujer, and J. Eugster.
Vom Wasser, Vol 48, p 47-70, 1977. 13 fig, 9 tab, 9 ref.

Descriptors: *Activated carbon, *Filtration, *Tertiary treatment, *Particle size, *Porous media, Filters, Carbon filters, Municipal wastes, Organic wastes, Analytical techniques, Sewage treatment, Waste water treatment.

In some instances, Switzerland's strict effluent standards necessitate advanced treatment to remove dissolved organic carbon from municipal waste water. Pilot-scale studies were used to examine the effect of operating parameters, including the brand of activated carbon, grain size, and filtration rate, on fixed bed adsorption processes. The experiments examined adsorption performance, concentration profiles, and activated carbon capacity. Data for oxygen consumption in the activated carbon bed were used to estimate the degree of biological degradation of organic compounds. Gas chromatography was used to study the removal of specific organic compounds. (Schulz-FIRL)
W78-03545

REMOVAL OF UNCOMMON TRACE METALS BY PHYSICAL AND CHEMICAL TREATMENT PROCESSES,
Municipal Environmental Research Lab., Cincinnati, OH.
S. A. Hannah, M. Jelus, and J. M. Cohen.
Journal Water Pollution Control Federation, Vol 49, No 11, p 2297-2309, November, 1977. 3 fig, 9 tab, 36 ref.

Descriptors: *Trace elements, *Heavy metals, *Coagulation, *Chemical precipitation, *Activated carbon, Pilot plants, Municipal wastes, Silver, Beryllium, Cobalt, Molybdenum, Antimony, Selenium, Tin, Titanium, Thallium, Vanadium, Lime, Iron compounds, Adsorption, Waste water treatment, Clarification.

Measurable concentrations of various trace metals which are toxic at even low concentrations can be found in domestic waste waters. Studies have been conducted to evaluate the capability of physical-

chemical processes in municipal waste water treatment for removing these metals. A research project at the EPA Environmental Research Center in Cincinnati, Ohio, utilized a 4 gpm continuous-flow pilot plant which received raw waste water from a residential suburb of the city. The plant included a rapid mix flocculator, settler with sludge storage tank, dual-media filter with backwash collection tank, and two parallel carbon adsorption systems. The raw waste water was dosed with salts of 11 uncommon trace elements, including: Ag, Be, Bi, Co, Mo, Sb, Se, Sn, Ti, Tl, and V. Metal removals by each unit process were calculated. The system was operated to provide optimum removals of suspended solids and organics rather than metals. The system was tested with three different coagulants, including lime, ferric chloride, and alum, and the metal removal efficiencies were compared. The data indicated that, with the exception of Sb and Mo, one or more of the coagulants were capable of achieving metal removals of more than 90%. For the lime system 90% removals were not achieved for Mo, Sb, and Se. In the ferric chloride system 90% removal did not occur for Co, Tl, Mo, Sb, and Se. Chemical clarification with alum removed less than 90% of Mo, Tl, Zn, Mn, Ni, Co, Cd, Sb, and Se. (Schulz-FIRL)
W78-03546

QUARTERNARY AMMONIUM THICKENING OF SEWAGE SLUDGE IN MAGNETIC FIELD,
Stevens Inst. of Tech., Hoboken, N.J. Dept. of Mechanical Engineering.
L. K. Wang, M. H. Wang, R. C. Ziegler, and M. P. Strier.
Industrial and Engineering Chemistry Product Research and Development, Vol 16, No 4, p 311-315, December, 1977. 3 tab, 24 ref.

Descriptors: *Flocculation, *Sludge treatment, *Separation techniques, *Magnetic studies, *Ammonium compounds, Coagulation, Dewatering, Sewage treatment, Activated sludge, Municipal wastes, Waste water treatment.

Since sludge handling and disposal costs comprise approximately 40% of the total cost of the activated sludge process of waste treatment, much research has been conducted in the fields of sludge thickening and volume reduction. A sludge dewatering method, involving simultaneous settling and thickening of nonmagnetic sludge by magnetic fields, is described. The technique involves chemical addition, flocculation, polarization, sedimentation, and disinfection. The process is based on the addition of finely divided iron oxide particles to the sewage sludge as both the weighing agent and the polarization-inducing agent prior to the addition of a coagulant and floc formation. The agglomerates which contain sludge solids, iron oxide, and a quarternary ammonium compound are then flocculated and passed through a magnetic field for further polarization to yield very high weight-to-surface-area floc particles. The high specific gravity of the condensed flocs results in rapid settling without the need for secondary flocculation. The addition of a quarternary ammonium compound also disinfects the settled sludge and supernatant. (Schulz-FIRL)
W78-03547

APPLICATION OF PHOTODYNAMIC OXIDATION TO THE DISINFECTION OF TAP-WATER, SEAWATER, AND SEWAGE CONTAMINATED WITH POLIOVIRUS,
Baylor Coll. of Medicine, Houston, TX. Dept. of Virology and Epidemiology.
C. P. Gerba, C. Wallis, and J. L. Melnick.
Photochemistry and Photobiology, Vol 26, No 5, p 499-504, 1977. 5 fig, 2 tab, 20 ref.

Descriptors: *Viruses, *Disinfection, *Dyes, *Viricides, *Chlorination, *Light, *Oxidation, Water pollution control, Microbiology, Water reuse, Public health, Sewage treatment, Waste water treatment, Municipal wastes.

The prevalence of enteroviruses in chlorinated waste water effluents presents a major obstacle to waste water reuse. Photoreactive dyes have already been used to inactivate microorganisms in a variety of medical applications. Laboratory studies have indicated that exposure to methylene blue dye and visible light can result in photoinactivation of poliovirus in tapwater, sewage, and seawater. Exposure of poliovirus type 2 to 670 nm light in solutions containing 5 ppm methylene blue at pH 10.0 resulted in an average virus reduction of 2.5 logs. A multi-hit inactivation event was suggested by the biphasic inactivation curve produced regardless of dye concentration, pH, temperature, sensitization time, nature of suspending solution or sequence of light exposure. The rate of virus photoinactivation was increased by pre-incubation of the dye-virus mixture at 24C. Increasing dye concentrations above 10 ppm did not significantly enhance photoinactivation. In the absence of visible light, high dye concentrations in the range of 20-45 ppm did result in significant inactivation of poliovirus. Alternating light and dark periods did not significantly affect inactivation. The use of natural light sources for dye-sensitized photoinactivation is suggested as a means of reducing disinfection costs. (Schulz-FIRL)
W78-03548

MAKING OPTIMUM USE OF FILTER MEDIA IN WASTEWATER FILTRATION,
Black and Veatch, Denver, CO.
M. J. Maxwell, S. W. Work, K. D. Linstedt, and E. R. Bennett.
Water and Sewage Works, Vol 124, No 12, p 56-61, December, 1977. 9 fig, 3 tab, 19 ref.

Descriptors: *Filtration, *Filters, *Porous media, *Packed beds, *Clarification, Pilot plants, Particle size, Effluents, Suspended solids, Sands, Design criteria, Coagulation, Sewage treatment, Waste water treatment.

A two-phase pilot plant investigation was used to examine the effects of chemical pretreatment and the depth and composition of the filter media on filter performance in waste water treatment. Activated sludge effluent was obtained from the Metropolitan Denver waste water treatment and used in studies on filtration of secondary effluent and alum-coagulated secondary effluent with and without settling prior to filtration. Components of the pilot system included: a head tank, rate control valves, presedimentation tank for minimizing influent solids variations, on-line alum injection, flocculation tank, clarifier, polymer feed, filters, and an on-line turbidimeter. Various bed depths of coal, sand, and garnet were employed in the study. The filters were operated in three modes: standard clarification, high rate clarification, and plain filtration. Filtrates were analyzed for BOD, COD, suspended solids, total phosphorus, and total and fecal coliforms. Plain filtration was capable of reducing suspended solids levels in the effluent to 1-2 mg/liter over filter runs in excess of 20 hr at 6 gpm/sq ft. Although coagulation with alum and polymer addition produced a high quality effluent, rapid head loss developed because of the high solids loading and relatively weak chemical floc. In mixed media filters, the coarser coal layer was responsible for removal of most of the floc solids. The finer sand and sand-garnet media were responsible for removal of most of the high rate system. Mixed media filters were more effective than dual media filters in the high rate and standard clarification systems, although this difference was not apparent during plain filtration. (Schulz-FIRL)
W78-03549

A LOOK AT NEWER METHODS FOR DEWATERING SEWAGE SLUDGES,
Municipal Environmental Research Lab., Cincinnati, OH.
For primary bibliographic entry see Field 5E.
W78-03550

FIBRE MATS FOR LANDSCAPE ENGINEERING.
For primary bibliographic entry see Field 8G.
W78-03551

CONCRETE STAVE TANKS.
For primary bibliographic entry see Field 8F.
W78-03552

COMPLETE SERVICE FOR SLURRY RECYCLING.
For primary bibliographic entry see Field 5E.
W78-03553

SUBMARINE PIPELINE FOR RIVER WEAR.
For primary bibliographic entry see Field 5E.
W78-03554

SOIL'S NATURAL PROCESSES CAN CLEAN WASTES FROM SEWAGE WATER.
Crops and Soils Magazine, Vol 30, No 2, p 23, November, 1977.

Descriptors: *Return flow, *Nutrient removal, *Soil disposal fields, *Sewage treatment, Phosphorus, Nitrogen, Soil chemical properties, Soil physical properties, Soil treatment.

Naturally occurring chemical and biological processes in soils has been recommended for waste water treatment by Clarence Lance of the United States Water Conservation Laboratory in Phoenix, Arizona. The method is suggested, in particular, for the removal of nitrogen and phosphate from waste water with possible applications in the removal of organic material and fecal bacteria from secondary sewage effluent. Studies at the Water Conservation Laboratory used soil-filled pipes as models of a land filtration system. Waste water application rates 20-30 times higher than those used for crop irrigation are considered feasible in renovation of waste water with a high-rate land filtration system. (Schulz-FIRL)
W78-03558

WASTE WATER SURVEY OF A PARTIALLY SEWERED CITY ,
For primary bibliographic entry see Field 5B.
W78-03559

ULTRASONIC SLUDGE DIP STICK.
For primary bibliographic entry see Field 5A.
W78-03561

SEROLOGICAL TYPING AND CHLORINATION RESISTANCE OF WASTEWATER CYANOPHAGES,
Virginia Commonwealth Univ., Richmond. School of Dentistry.
For primary bibliographic entry see Field 5A.
W78-03562

HOW RE ABLE IS INSTRUMENTATION IN WASTEWATER APPLICATIONS,
Raytheon Co., Portsmouth, RI.
For primary bibliographic entry see Field 5A.
W78-03563

STUDY OF POLYSACCHARIDES IN ACTIVATED SLUDGE MUCILAGE (ETUDE DES POLYOSIDES DU MUCILAGE DES BOUES ACTIVEES),
Institut National de la Recherche Agronomique, Villeneuve d'Ascq (France). Station de Technologie Alimentaire.
J. P. Rideau, and J. N. Morfaux.
Water Research, Vol 10, No 11, p 999-1003, 1976. 6 fig, 18 ref.

Descriptors: *Polymers, *Activated sludge, *Flocculation, *Organic compounds, Analytical techniques, Sludge treatment, Municipal wastes, Waste water treatment, Industrial wastes.

Activated sludges from the treatment of municipal and industrial waste water were used in experiments to isolate the polymer or polysaccharide fraction in sludge. The studies revealed that carbohydrates and related compounds such as galacturonic acid and rhamnose were partially incorporated in the activated sludge mucilage. Extracellular polymers or exopolysaccharides were synthesized during the contact period of contact-stabilization and were partially incorporated in the contact period of contact-stabilization and were assimilated during sludge stabilization. Morphological features of the floc particles, as in the case of filamentous bulking, are said to be related to the activated sludge polysaccharides. (Schulz-FIRL)
W78-03565

TESTS FOR NITRIFYING AND DENITRIFYING ABILITY OF ACTIVATED SLUDGE,
New York State Dept. of Environmental Conservation, Albany.
C. Beer.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 5, p 558-564, 1977. 6 ref.

Descriptors: *Analytical techniques, *Activated sludge, *Nitrification, *Denitrification, *Sewage bacteria, Laboratory tests, Sludge treatment, Waste water treatment.

Analytical procedures are presented for the quantification of the bacterial mass of a single-stage activated sludge system designed for carbonaceous contaminant removal, nitrification, and denitrification. The test for nitrifying ability is based on the respiration activity of Nitrosomonas. The substrate-mediated test is conducted at an ammonia-N concentration greater than 2.5 mg/liter to provide for a zero order reaction. The test is 1 hr in length and is conducted on mixed liquor rather than on return sludge. The pH is optimized and mass transport difficulties are eliminated by placing the heterotrophic bacteria in a state of endogenous respiration and by increasing turbulence and dilution. The test for the percentage of denitrifying bacteria in mixed liquor solids is based on endogenous nitrate respiration and is conducted on deoxygenated return sludge. Deoxygenation is accomplished by the addition of sodium thiosulfate and anerobic conditions are maintained throughout the experiment. The denitrifying ability is based on the N03/N02-N ratio. (Schulz-FIRL)
W78-03568

VENTURI FUMES AND REQUIREMENTS FOR MEASUREMENTS TECHNIQUES FOR EXACT MEASUREMENTS OF QUANTITIES OF WASTE WATER VENTURIKANAELE UND MESSTECHNISCHE ANFORDERUNGEN FUER GENAUE ABWASSERMENGEN),
Zuellig A. G., Rheineck (Switzerland). Apparatebau fuer die Wasserwirtschaft.
For primary bibliographic entry see Field 5A.
W78-03569

THE COMPATIBILITY OF OXYGENATION CAPACITY MEASUREMENTS (VERGLEICHBARKEIT VON SAUERSTOFFEINTRAGSMESSUNGEN),
Stuttgart Univ. (West Germany). Inst. fuer Siedlungswasserbau, Wasserguetewirschaft und Abfallwirtschaft.
F. Bingel.
Wasserwirtschaft, Vol. 67, No. 6, p 168-174, 1977. 5 fig, 6 tab, 7 ref.

Descriptors: *Oxygenation, *Aeration, *Equipment, *Operation and maintenance, *Dissolved oxygen analyzers, Temperature, Model studies, Analytical techniques, Oxygen demand, Sewage treatment, Waste water treatment.

Observations on oxygenation capacity and oxygen demand of sewage are presented for use by consulting engineers and planners in the design of sewage treatment plant equipment used for aeration. Observed values for oxygenation capacity and oxygen uptake were compared with values predicted by aeration equipment manufacturers. Surveys indicated that there were often wide differences in oxygen input and actual uptake by sewage. Temperature and the degree of mixing partially explain the discrepancies. Possible sources of measurement error are described. (Schulz-FIRL)
W78-03570

DESIGN AND CONSTRUCTION OF AN ACTIVATED SLUDGE PLANT,
Engineering-Science, Inc., Cleveland, OH.
N. L. Prescan.
AIChE Symposium Series, Vol. 73, No. 167, p 78-85, 1977.

Descriptors: *Design criteria, *Planning, *Equipment, *Operation and maintenance, *Design data, Pumping, Construction, *Treatment facilities, Costs, Waste water treatment.

In the development of an activated sludge treatment facility, the construction of a final detailed design, preparation of plans and specifications, construction of the facility, and initiation of operation generally follow the establishment of design criteria and process flow sheets. An effective final design is dependent on the engineer's accurate interpretation of design criteria and on the selection of the proper equipment and constraints. Various tasks which must be completed before a final detailed design is possible are outlined. The selection of process units is usually based on the constraints set by the material to be handled, the degree of performance requirement, and operation and maintenance requirements along with economic considerations and the designer/owner preference. Pumping systems, clarification, aeration, and other process stages are discussed with respect to process units. The construction of process and instrumentation diagrams is suggested to provide an overview of the plant early in the project. Coordination of the detailed design with operations and construction is discussed. (Schulz-FIRL)
W78-03573

WASTEWATER EFFLUENT DISCHARGE TO COOLING LAKES,
Texas Univ. at Austin. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5E.
W78-03575

INACTIVATION OF ENTERIC VIRUSES IN WASTEWATER SLUDGE THROUGH DEWATERING BY EVAPORATION,
Sandia Lab., Albuquerque, NM.
R. L. Ward, and C. S. Ashley.
Applied and Environmental Microbology, Vol 34, No 5, p 564-570, November 1977. 3 fig, 6 tab, 23 ref.

Descriptors: *Viruses, *Dewatering, *Fertilizers, *Sludge treatment, *Sludge disposal, Public health, Viricides, Ultimate disposal, Drying, Analytical techniques, Waste water treatment.

The use of waste water sludge as a fertilizer or animal feed supplement is dependent on the ability to inactivate the pathogens in the sludge without reducing its economic value. Studies were conducted to examine the effects of dewatering on the inactivated rates of enteric viruses in sludge. Raw sludge from the Albuquerque sewage treatment plant in New Mexioc was seeded before and after dewatering with Poliovirus type 1, coxsackievirus B1, and reovirus type 3. Dewatering was accomplished by evaporation at 21C. Measurements of the loss of viral plaque-forming units during dewatering indicated that the recoverable infectivity of poliovirus decreased gradually until the sludge solids content reached 65%. During evaporation from 65 to 83% solids, the virus titer decreased by more than 3 orders of magnitude. This was attributed to irreversible inactivation since viral particles were observed to have released extensively degraded RNA molecules. The inactivation of poliovirus by dewatering is supported by the significantly slower inactivation rates observed for sludge seeded after drying. Similar behavior was observed with reovirus type 3 and coxsackievirus B1, suggesting that dewatering by evaporation may be a viable method of inactivating all enteric viruses in sludge. (Schulz-FIRL)
W78-03576

IDENTIFICATION OF END PRODUCT RESULTING FROM OZONATION AND CHLORINATION OF ORGANIC COMPOUNDS COMMONLY FOUND IN WATER,
Illinois Univ. at Urbana-Champaign. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 5A.
W78-03578

CHEMICAL MONITORING OF SEWAGE SLUDGE IN PENNSYLVANIA,
Pennsylvania Agricultural Experimental Station, University Park.
For primary bibliographic entry see Field 5A.
W78-03579

COMPARISON OF MEMBRANES FOR FECAL COLIFORM RECOVERY IN CHLORINATED EFFLUENTS,
Illinois State Water Survey, Peoria. Water Quality Section.
For primary bibliographic entry see Field 5A.
W78-03581

PERIODIC OPERATION OF AN ACTIVATED SLUDGE PROCESS,
Houston Univ., TX.
D. Sincic, and J. E. Bailey.
AIChE Symposium Series, Vol. 73, No. 167, p 135-139, 1977. 2 fig, 9 ref.

Descriptors: *Activated sludge, *Fluctuations, *Mathematical models, *Design criteria, *Model studies, Equations, Flow rates, Biological treatment, Waste water treatment.

A variety of studies have been conducted to develop a control design for the activated sludge process which would minimize the effects of disturbances on process performance and effluent quality. A mathematical modelling and simulation study of the application of periodic control to the activated sludge process is presented. The model is based on the activated sludge reactor as two ideal continuous flow stirred tank reactors. Assumptions include a constant recycle sludge concentration and a recycle substrate concentration equal to the substrate concentration in the activated sludge reactor effluent. A series of equations for the two-tank process are presented. The periodicity of the fluctuations in feed rate and composition is mathematically defined and used to modify the process variables. A variability index based on the mean square fluctuation of effluent substrate concentration about its mean is presented. Process conditions and parameters used during the calculations are defined, including recycle sludge concentration; average value and upper limit of sludge recycle flow rate; volume; sludge:substrate ratio; and the autocatalytic kinetics rate constant. The effects of optimal period control and steady control on the effluent substrate concentration are illustrated. (Schulz-FIRL)
W78-03582

NEAR OPTIMAL EFFLUENT CONTROL FOR AN EXISTING ACTIVATED SLUDGE WASTE WATER TREATMENT PROCESS,
Sherbrooke Univ. (Quebec). Dept. of Chemical Engineering.
N. Therien, S. Perdrieux, and P. Harrington.
AIChE Symposium Series, Vol 73, No 167, p 95-104, 1977. 11 fig, 2 tab, 19 ref.

Descriptors: *Mathematical models, *Activated sludge, *Aeration, *Clarification, *Sludge treatment, Equations, Pumping, Design criteria, Sewage treatment, Waste water treatment.

The waste water treatment plant for Sherbrooke University Hospital in Sherbrooke, Quebec, Canada, was the site of an evaluation of a model for predicting the dynamic behavior of the activated sludge process with respect to a control action. In this study the control action involved direct injection of active solids into the aeration unit of an activated sludge process in time in order to minimize the mean daily concentration of organic substrate flowing out of the clarifier in response to variations in the influent. In the presentation of the mathematical model for the aerator-clarifier system, differenrial equations for the substrate and biomass entering and leaving the aeration unit and clarifier are defined. A set of equations for the optimization of the control problem and for numerical synthesis of the control function are presented. Calculations indicated that a feasible control scheme for the Sherbrooke University Hospital to provide a pulse of solids in time could be realized by simply installing an on-off automatic timer activating an injection pump at the plant. (Schulz-FIRL)
W78-03585

A REVIEW OF FILM FLOW MODELING AS APPLIED TO TRICKLING FILTER SYSTEMS,
Hydroscience, Westwood, NJ.
G. J. Kehrberger.
AIChE Symposium Series, Vol 73, No 167, p 151-159, 1977. 7 fig, 20 ref.

Descriptors: *Mathematical models, *Trickling filters, *Filtration, *Porous media, *Model studies, Organic loading, Flow rates, Design data, Biological treatment, Microorganisms, Waste water treatment.

The trickling filter has been used in waste water treatment as a means of biologically removing organic carbon from municipal and industrial wastes. Microorganisms grown and maintained on the surface of the filter media receive oxygen and remove nutrients from the liquid film of waste water on the surface media. Various mathematical models have been developed to describe trickling filter performance as a function of organic loading, hydraulic loading, depth, and recirculation. A general review of film flow models with emphasis on liquid-phase concepts which can be used to examine trickling filter performance is presented. Liquid phase film flow models based primarily on mass balances within the reactor include the general heterogeneous model, the reaction control model, the pseudo-homogeneous model, and models for hydraulic loading response and recirculation effects. Models based on the bacterial film and biological activity are also described. (Schulz-FIRL)
W78-03586

PERFORMANCE PREDICTIONS FOR THE REMOVAL OF AQUEOUS FREE CHLORINE BY PACKED BEDS OF GRANULAR ACTIVATED CARBON,
Georgia Inst. of Tech., Atlanta.
M. T. Suidan, V. L. Snoeyink, and R. A. Schmitz.
AIChE Symposium Series, Vol 73, No 166, p 18-24, 1977. 5 fig, 9 ref.

Descriptors: *Mathematical models, *Chlorination, *Activated carbon, *Adsorption, *Model studies, Hydrogen ion concentration, Flow rates, Chemical oxygen demand, Particle size, Porous media, Effluents, Waste water treatment, Water treatment.

The chlorine residual in treated water and waste water may have deleterious effects such a toxicity to species in receiving waters; taste or odor in drinking water; and adverse effects on ion exchange resins and industrial processes. Various studies have been conducted on methods of dechlorination. A mathematical model for free chlorine reacting with activated carbon in a packed bed was used in studies to show the effect of pH, particle size, temperature, influent concentration, and flow rate and contact time on the breakthrough curve and on the buildup of surface oxides of carbon within the bed. The effect of pH on the breakthrough curve was examined at pH values of 4.0, 7.6, and 10.0. The reaction of chlorine with the carbon was slowest at pH 10. With influent concentrations of 1,5, 20 and 100 mg/liter, the higher concentrations resulted in more rapid breakthrough of chlorine and more rapid poisoning of the carbon. Chlorine removal increased with a decrease in carbon particle size. Removal was greater at lower flow rates and at longer contact times. The reaction between chlorine and the carbon bed was slowed down appreciably with decreasing temperatures. (Schulz-FIRL)
W78-03587

CONSIDERATION OF SUSPENDED SOLIDS TRANSPORT IN ACTIVATED SLUDGE SYSTEM SYNTHESIS: I. SIMULTANEOUS USE OF CLARIFICATION AND SLUDGE THICKENING MODELS,
Kansas State Univ., Manhattan.
L. E. Erickson, J. C. Heydweiller, and L. T. Fan.
AIChE Symposium Series, Vol 73, No 167, p 105-111, 1977. 3 fig, 3 tab, 16 ref.

Descriptors: *Mathematical models, *Clarification, *Design criteria, *Suspended solids, *Microorganisms, Equations, Sludge treatment, Aeration, Model studies, Waste water treatment.

The design of an activated sludge system consisting of a completely mixed aeration vessel and a secondary clarifier was considered with respect to minimizing the total volume of the system. Since the optimization of designs for waste treatment systems is dependent on accurate descriptions of the various processes, mathematical models to describe clarification and thickening in secondary clarifiers have received considerable attention. A clarifier model which considers overflow and underflow (clarification and thickening) is presented. Equations for the flow balance around the secondary clarifier, the organism balance, and the organism concentration in the overflow stream are presented. Equations for the bulk, settling, and total downward flux of organisms in the system. The optimization of a system design is described with respect to the balance equations, the organism concentration in the underflow, inlet conditions, the desired effluent quality, and the clarifier depth. The effects of operating conditions such as loading, recycle flow rate, and sludge wasting rate on actual clarifier performance are discussed. (Schulz-FIRL)
W78-03588

ESTABLISHING THE BASIS FOR A WASTEWATER TREATMENT PLANT DESIGN,
Texas Univ. at Austin. Dept. of Civil Engineering.
E. F. Gloyna.
Boletin de la Academia de Ciencias Fisicas, Mathematicas y Naturales, Caracas, Vol 37, No 111, p 31-46, First Trimester, 1977. 10 fig, 3 tab, 10 ref.

Descriptors: *Design criteria, *Model studies, *Aerobic treatment, *Anaerobic digestion, *Oxidation lagoons, Nitrification, Oxidation, Organic wastes, Waste water treatment, Sewage treatment, Algae, Anaerobic conditions, Nutrient removal.

An analysis of the microbial processes in waste stabilization is presented as part of a discussion on the basic design concepts of aerobic, anaerobic, and facultative biological waste water treatment systems. Kinetic equations are presented for the net rate of growth of microorganisms and substrate utilization in biological treatment systems. Process efficiency is related to the specific removal of some soluble substrate or the combined removal of BOD in all forms. Aerated lagoons with biomass recycling and the continuous activated sludge process without biomass recycling comprise the major types of aerobic systems. Equations for materials balance, oxygen requirements, and sludge production in aerobic treatment systems are presented. Anaerobic degradation involves hydrolysis and subsequent fermentation of organic wastes with the conversion of volatile acids into methane and carbon dioxide by anaerobic system are discussed with respect to temperature, pH, oxidation-reduction potential, volatile acids concentration, and alkalinity. Facultative waste stabilization ponds rely on the oxidation of carbonaceous organics by aerobic and facultative bacteria, nitrification, reduction of carbonaceous organics by anaerobic bacreria, and oxygenation of surface liquids by algae. Guidelines are presented for pond depth, surface area, and temperature. (Schulz-FIRL)
W78-03589

USE OF ACTIVATED FLUID COKE TO REMOVE ORGANIC CONTAMINANTS FROM WASTE WATERS,
Exxon Research and Engineering Co., Linden, NJ. (Assignee).
S. E. Jaros, and W. J. Metrailer.
U.S. Patent No. 4,036,750, 14 p, 2 fig, 2 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1270, July 19, 1977.

Descriptors: *Patents, *Waste water treatment, *Organic wastes, *Water pollution treatment, Industrial wastes, Adsorption, Particle size, Particle shape, Activated fluid coke.

Organic material is removed from waste water by contacting the waste water under adsorption conditions with activated fluid coke. The activated fluid coke may be prepared by contacting fluid coke with a gaseous mixture containing steam at temperatures of at least about 1500 degrees F. For a period of time sufficient to convert at least 35 weight % of the fluid coke to gaseous products. The activated fluid coke so formed has a total surface area of at least 400 square meters per gram. The large pore volume and large total surface area, along with the particle size, particle size distribution, particle shape, particle density and attrition resistance of the activated fluid coke, result in the activated fluid coke exhibiting excellent properties as an adsorbent, particularly for removing organic materials from waste water streams. (Sinha - OEIS)
W78-03591

METHOD OF TREATING WATER CONTAINING CHROMATE,
Kurita Water Industries Ltd., Osaka (Japan). (Assignee).
N. Orita, K. Yabe, and A. Kawanami.
U.S. Patent No. 4,036,751, 14 p, 15 fig, 1 tab, 13 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1270, July 19, 1977.

Descriptors: *Patents, *Water treatment, *Waste water treatment, *Industrial wastes, *Water pollution treatment, Water purification, Ion exchange, Chromium, Resins, Separation techniques, Regeneration, Back wash.

The principal object of the invention is to enhance the chromate ion removal efficiency in treating water containing chromate, and minimize the leakage of hexavalent chromium into the treated water. In addition the ion-exchange resins are regenerated with a small amount of regenerant. The method consists in bringing the water to be treated into contact with ion-exchange resins. The water is first passed through a bed of weakly acidic cation exchange resin in H-form, then passing it through a bed of weakly basic anion exchange resin in salt form to remove the chromate from the water. An alkali metal hydroxide solution is introduced into the weakly basic anion exchange resin bed in the reverse direction relative to the direction of passing of the water to elute chromate. An acid solution is then introduced to convert the weakly basic anion exchange resin into salt form. (Sinha - OEIS)
W78-03592

DEWATERING CLAY SLURRIES,
American Cyanamid Co., Stamford, CT. (Assignee).
M. S. Lassiter, Sr.
U.S. Patent No. 4,036,752, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1271, July 19, 1977.

Descriptors: *Patents, *Dewatering, *Waste water treatment, *Compaction, Consolidation, Landfills, Soil density, Ore processing industry.

Solids suspended in water such as slimes, tailings, wastes, pulps and the like are compacted to a useful state by spraying a sand slurry over the surface of the suspension in such a manner as to give high solids density. The process of removing water from waste products of ore processing operations comprises depositing slurried slimes of about 3 to 5% solids into a mined out area until the area is full, removing water from the settled slimes until about one foot of water remains upon the slurried slimes, floating sprinkler heads on the water and spraying sand slurry over the surface of the waste product with a spray nozzle unit comprised of a nozzle mounted in a pipe tee for dispersing the sand slurry upward. (Sinha - OEIS)
W78-03593

PYROLYSIS PROCESS FOR TREATING SEWAGE SLUDGE CONTAINING CHROMIUM,
NGK Insulators, Ltd., Nagoya (Japan). (Assignee).
T. Majima, and K. Hara.
U.S. Patent No. 4,036,753, 4 p, 1 fig, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1271, July 19, 1977.

Descriptors: *Patents, *Sewage treatment, *Sludge treatment, *Chromium, Incineration, Water pollution sources, Soil contamination, Sewage sludge, Waste treatment.

When the sewage sludge contains chromium, trivalent chromium in the sludge is oxidized into harmful water soluble hexavalent chromium in the course of incinerating, so that if such an incinerated ash is discharged from reclamation, the harmful hexavalent chromium in the incinerated ash is released into underground water, rivers and the like by rain water, which constitutes a risk of environmental pollution. The main object of the invention is to improve a pyrolysis process for treating sewage sludge containing chromium and to prevent pollution. The pyrolysis process for treating sewge sludge containing chromium comprises burning combustible gas produced by thermal decomposition of the sewage sludge in a pyrolysis furnace by supplying oxygen of less than the theoretical amount necessary for burning the sewage sludge, and keeping the partial pressure of oxygen in the furnace substantially at zero. (Sinha - OEIS)
W78-03594

BIOLOGICAL DENITRIFICATION OF WATER,
D. R. Anderson.
U.S. Patent No. 4,039,438, 5 p, 3 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 253, August 1977.

Descriptors: *Patents, *Waste water treatment, *Water quality control, *Water pollution treatment, Agricultural runoff, Sewage effluents, *Denitrification, *Nitrates, Anaerobic bacteria, Cellulose, Pulp wastes, Biological treatment, Waste paper.

A process for biological denitrification of nitrate containing waters, particularly agricultural drain waters, sewage effluents and ground waters is disclosed. The invention comprises the biological denitrification of waters containing from 10 to about 250 parts per million of nitrogen as nitrate and an insufficient quantity or organic material to support the necessary anaerobic bacterial action for effecting reduction of any substantial quantities of the nitrate content. The water is contacted with a solid substrate usually a cellulosic material comprised chiefly of paper, or paper pulp, in the presence of an anaerobic bacterial culture with sufficient time and favorable growth conditions to permit the anaerobic bacteria to undergo an active growth phase and effect reduction of the nitrate content of the water. This process can thereby solve two ecological problems; it can provide a disposal for waste paper such as newsprint and also effects the reduction of nitrate in waste waters sufficiently to permit reuse and/or return of the water to the surrounding watershed. (Sinha-OEIS)
W78-03604

REVERSE OSMOSIS MEMBRANE,
Department of the Interior, Washington, DC. Office of the Secretary.
For primary bibliographic entry see Field 3A.
W78-03606

CONDENSATE PURIFICATION PROCESS,
Crane Co., New York. (Assignee).
S. Tahara, T. Murata, S. Shimaya, and G. J. Crits.
U.S. Patent No. 4,039,443, 6 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 255, August 2, 1977.

Descriptors: *Patents, *Waste treatment, *Water purification, Industrial water, Water quality control, *Ion exchange, Resins, Cation exchange, Anion exchange, Resin regeneration, Condensate water.

A method of purifying condensate water, specifically a method of using hydrazine in the regeneration of ion exchange resins, after the ion exchange treatment of condensate water, uses a mixed bed of ion exchange resins. The invention is especially suitable for application to steam turbine power systems including large scale electric power generation systems. In regenerating the charged resin after passing condensate water through the mixed bed of ion exchange resins, the mixed bed is separated into a layer of anion exchange resin and a layer of cation exchange resin. After the anion exchange resin layer is regenerated with caustic soda, it is treated with an aqueous solution of hydrazone. The aqueous solution of hydrazone, after the treatment, is purified by passing the liquid through a bed of hydrazine type cation exchange resin. The purified aqueous solution of hydrazone is reused in the treatment of the anion exchange resin layer. (Sinha-OEIS)
W78-03608

WELSH WATER RE-ORGANIZATION.
For primary bibliographic entry see Field 5G.
W78-03623

EPA ENLISTS ARMY TO MANAGE SEWAGE PLANT CONSTRUCTION.
For primary bibliographic entry see Field 5G.
W78-03625

HISTORIC TURNING POINTS IN MUNICIPAL WATER SUPPLY AND WASTEWATER DISPOSAL, 1850-1932,
Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of History, Technology, and Urban Affairs.
J. A. Tarr, and F. C. McMichael.
Civil Engineering-ASCE, Vol. 47, No. 10, p 82-86, October, 1977.

Descriptors: *History, *Cesspools, *Sewerage, *Sewage treatment, *Waste water treatment, Water treatment, Water pollution control, Public health, Municipal wastes, Combined sewers, Sewers, Storm water, Waste water disposal.

During much of the 19th century government involvement in waste water management was minimal, and the cesspool-privy system was the only means for collection and treatment of human wastes. Urban population growth and the development of new urban water supply systems from 1850 to 1890 overloaded existing waste treatment systems. Piped water supply systems and the resulting increase in the per capita water consumption also placed great demands on the cesspool-privy system. Water-carriage removal and sewerage systems were adopted to alleviate overflowing of cesspools and privies. From 1880 to 1890 the virtues of separate vs. combined sewer systems were debated. An extensive report by Rudolf Herirg, an American sanitary engineer, on the status of sewer systems in Europe was published. During the period 1900-1932, stream pollution by sewage and resulting higher typhoid fever rates in downstream communities led to more attention to water pollution control and water treatment. Sand filters and trickling filters were first evaluated for water and waste water treatment during the early part of the 20th century. (Schulz-FIRL)
W78-03629

INEQUITIES FOR SMALL FOOD PROCESSING PLANTS RESULTING FROM LIQUID WASTE TREATMENT REGULATIONS,
Teepak, Inc., Danville, IL.
For primary bibliographic entry see Field 5G.
W78-03648

WATER MONITOR SYSTEM: PHASE I TEST REPORT,
National Aeronautics and Space Administration, Houston, TX. Lyndon E. Johnson Space Center.
For primary bibliographic entry see Field 5A.
W78-03663

THE RELATIONSHIP BETWEEN THE BORON CONCENTRATION OF EAST LANSING MUNICIPAL WASTEWATER AND RETENTION TIME THROUGH THE MICHIGAN STATE UNIVERSITY WATER QUALITY MANAGEMENT PROJECT UNDER CONTINUOUS FLOW CONDITIONS,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 5A.
W78-03680

POSSIBILITIES FOR TREATING WASTEWATERS GENERATED IN ELECTROPLATING SHOPS TO AVOID SPECIAL WASTES--METAL RECOVERY IN PLACE OF SLUDGE DISPOSAL. PART III (MOEGLICHKEITEN ZUR BEHANDLUNG GALVANISCHER ABWAESSER UNTER VERMEIDUNG VON SONDERABFAELLEN--METALLRUECKGEWINNUNG STATT SCHLAMMDEPONIE. TEIL III),
R. Kammel, and H. W. Lieber.
Galvanotechnik, Vol. 68, No. 5, p 413-418, 1977. 16 fig.

Descriptors: *Recycling, *Ion exchange, *Cadmium, *Metals, *Chromium, *Separation techniques, Neutralization, Chelation, Industrial wastes, Heavy metals, *Waste water treatment.

Ion-exchange resins offer the possibility of recovering the heavy metals from industrial effluents. The chelating resins are suitable for the selective removal of certain metals. One example of ion-exchange technology is the recovery of cadmium. Cadmium is first recovered to a large extent electrolytically from cadmium-containing waste water, and the balance is removed with a weakly acidic cation-exchange resin from a solution whose pH had been adjusted to 5.4. Afterwards, the effluent can be neutralized without fear of producing cadmium-containing sludge. Chromi acid can be recovered from waste water which is first passed through a strongly acidic cation-exchange resin and then through a weakly basic anion-exchange resin. The resin is then renewed with a 5% sodium hydroxide solution yielding about 80 g/liter sodium dichromate, which can then be recycled. Gold is present in gold-plating wastes as the dicyanoaurate comples, which can be removed from its solutions with a strongly basic anion-exchange resin. Ion-exchange resins can be used to remove other ions such as silver, nickel, and copper from dilute solutions, and the continued improvement of ion-exchange resin selectivity offers much promise. (Schwartz-FIRL)
W78-03689

OXIDATION PROCESSES IN ACTIVATED SLUDGE AT HIGH DISSOLVED OXYGEN CONTRACTIONS,
K. L. Wyatt, P. Brown, and F. A. Shabi.
Journal of the Institute of Water Pollution Control, Vol. 76, No. 3, p 340-354, 1977. 4 fig, 4 tab, 18 ref, append.

Descriptors: *Activated sludge, *Operation and maintenance, *Oxygenation, *Pilot plants, *Nitrification, *Dissolved oxygen, Treatment facilities, Municipal wastes, Oxidation, Industrial wastes, Sludge treatment, Analytical techniques, Sewage treatment, *Waste water treatment.

Pilot plant studies at the Davyhulme sewage treatment plant in England were used to examine the mechanisms of oxidation in the activated sludge process at high dissolved oxygen concentrations (up to 15 mg/liter). The objective of the study, conducted by the North West Water Authority, was to evaluate the oxygen-activated sludge system for nitrification, process variants, and performance. Operational and design data for the pilot facilities are discussed, including: pilot-plant equipment and operation procedures; staged oxygenation system; completely-mixed activated sludge system; final settling tanks and return activated sludge systems; surplus sludge disposal; oxygen/air comparative tests; and monitoring equipment and testing procedures. Studies with municipal and combined municipal/industrial wastes indicated that the performance of the completely mixed reactor with gas stripping pretreatment at uniform mixed liquor DO concentrations of 10 mg/liter was comparable to the liquid staged reactor. Nitrification was achieved with the use of the oxygenation system with best results occurring when sodium hydroxide was used to maintain the pH/alkalinity within a 7.3-8.0 range. Better overall performance in the treatment of combined wastes was observed during use of the reactor at DO concentrations of 10 mg/liter than with conventional air concentrations of 1-2 mg/liter. Surplus sludge production was reduced by as much as 40% by the high dissolved oxygen concentrations in the reactor. (Schulz-FIRL)
W78-03690

5E. Ultimate Disposal Of Wastes

RECOVERY AND REUSE OF USEFUL MATERIALS FROM POLLUTANTS OF DYESTUFF INDUSTRY,
Arlabs Ltd, Bhatghar (India).
For primary bibliographic entry see Field 5D.
W78-03204

RECOVERY AND REUSE OF MATERIALS FROM DYESTUFF INDUSTRY,
V. J. T. Inst., Bombay (India). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5D.
W78-03205

ECONOMICS OF WASTE DISPOSAL--A CONTRACTOR'S VIEW,
E. P. Austin.
International Dyer and Textile Printer, Vol. 158, No. 5, p 240-242, September, 1977.

Descriptors: *Textiles, *Water pollution sources, *Dyes, *Economics, Waste disposal, *Costs, Effluents, Water pollution, Industrial wastes, Waste water treatment, Waste water disposal.

British water authorities will allow liquid effluent to be discharged from textile plants after specified standards have been met. Physical, chemical, and biological methods are available to treat effluents. To correctly design an effluent treatment plant, information is required on the number of effluent sources, whether storm and/or surface water enters the effluent, the volume of effluent, the length of time during which effluents are discharged, and the frequency and volume of strong effluent dumped into the drains. Some knowledge of anticipated process changes or expansion, effluent composition, applicable effluent standards, where the treated effluent will be discharged, and the treatability of the effluent is also required. Disposal costs for industrial waste water depend on volume and pollutant load. A brief case history and treatment process outline for effluents from textile dyeing and finishing are given. Rotary screens, aeration tank, lime slurry mixing tank, settling tank, thickening tank, and rotary vacuum filters comprise the major types of equipment used in waste water treatment for the textile dyeing and finishing operation. A formula for calculating industrial waste treatment charges is presented. (Snyder-FIRL)
W78-03210

EARTHWORMS TO AID SLUDGE DISPOSAL.
Chemical Engineering, Vol 84, No 26, p 82, December, 1977.

Descriptors: *Biological treatment, *Treatment facilities, *Annelids, *Sludge, *Sludge disposal, United States, Soil Amendments, Fertilizers, Solid wastes, Organic matter, Pilot plants, Waste water treatment.

A facility will be built by Solid Waste Resources, Ltd. of Eugene, Oregon, for the production of a soil-enriching mix from solid wastes with the aid of earthworms. Red wiggler worms will be used because they rapidly consume large quantities of organic matter and convert it into manure containing balanced quantities of nitrogen, phosphates and potash, with soluble concentrations of copper, iron, zinc, and trace minerals. The earthworms digest a batch of sludge in about 32 days. About 350 tons of worm castings are produced per 1,000 lb of sludge. In a 300-sq ft facility used for pilot plant testing, the daily sludge-consumption rate averaged 0.76 lb set solids per sq ft of worm area. Eleven waste-disposal plants using earthworms are in operation in Japan under the auspices of Aoka Sangyo Company in Okayama. (Snyder-FIRL)
W78-03221

DEVELOPMENT OF A SOIL-WASTE INTERACTION MATRIX FOR ASSESSING LAND DISPOSAL OF INDUSTRIAL WASTES,
Chemical Engineering Research Consultants Ltd., Toronto (Ontario).
C. R. Phillips, J. S. Nathwani, and H. Mooij.
Water Research, Vol 11, No 10, p 859-868, 1977. 3 fig, 4 tab, 4 ref.

Descriptors: *Analytical techniques, *Soil contamination effects, *Sludge disposal, Soil amendments, *Hydrology, Soil investigations, Soil properties, On-site data collections, Industrial wastes, Toxicity, Groundwater, Water pollution control, Waste water disposal.

Assessing the environmental impact of disposal of industrial wastes on land is described by an interaction matrix. A procedure is developed for ranking liquid industrial wastes and possible disposal sites. Parameters used to describe wastes include effects (toxicity, groundwater pollution, and disease transmission potential), fate (chemical and biological persistence, and sorption), behavioral properties (viscosity, solubility, acidity/basicity), and waste application rate. Soils are characterized according to permeability and sorption. The distance to the point of application and the thickness of the porous layer are input as location parameters. Hydrologic parameters include the water table gradient and the infiltration rate. A matrix which combines waste point scores (rows) with soil-site point scores (columns) is used to quantify the interactions and relate them to acceptability levels. This matrix is intended to be used by regulatory agencies in determining suitability of sites for industrial waste disposal. (Snyder-FIRL)
W78-03222

LEATHER TANNING AND FINISHING WASTE MANAGEMENT RESEARCH AND DEVELOPMENT PROGRAM,
Industrial Environmental Research Lab.-Cincinnati, Corvallis, OR. Corvallis Field Station.
For primary bibliographic entry see Field 5D.
W78-03225

PHYSICAL FACTORS AFFECTING DREDGED MATERIAL ISLANDS IN A SHALLOW WATER ENVIRONMENT,
Texas A and M Univ., College Station. Dept. of Geology.
J. E. Stinson II, and C. C. Mathewson.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 1-17, December 1976. 9 fig, 8 ref.

Descriptors: *Dredging, *Texas, *Lagoons, *Spoil banks, Disposal, Erosion, Sediment transport, Geomorphology, Coasts, On-site investigations, Meteorology, Bays, Winds, *Padre Island(Tex), *Murdock basin(Tex).

Regional geologic processes should be considered when choosing locations for dredged material disposal sites. Topography, bathymetry, geomorphology, meteorology, and water circulation must be examined for a full understanding of the active processes and their effects. Winds and waves are the physical factors considered to be most dominant. Winds control sand transport across Padre Island and water levels and circulation in Laguna Madre and define the direction of current and sediment movement. Erosion and shoaling of dredged material by waves in the lagoon parallel the geomorphic trends of the area. When using open water disposal methods while dredging channels, the dredged material should be placed on the downdrift side of the channel to avoid the return of sediment to the channel. (See also W77-09325) (Humphreys-ISWS)
W78-03227

A NEW CONCEPT FOR DREDGED MATERIAL DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
M. R. Palermo, and R. L. Montgomery.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 18-53, December 1976. 15 fig, 2 tab, 7 ref.

Descriptors: *Dredging, *Waste disposal, *Research and development, Spoils bank, Disposal, Sites, Landfills, Land use, Ultimate disposal, Land development, Legal aspects, Management, Treatment, Reusable disposal facilities.

Acquisition of suitable land for confined disposal of dredged material has become increasingly difficult due to rising cost and public objection to land use for this purpose. This problem could be minimized if the useful life of disposal areas could be extended, allowing reuse over longer periods. The concept of disposal site reuse involves the reduction in volume and/or actual removal of dredged material from the disposal area for use elsewhere, thereby allowing additional placement of dredged material at the site. Multiple advantages can be realized through site reuse: (1) a permanent reusable site would be provided for maintenance dredging at a centralized location; (2) operation of reusable sites would be environmentally compatible because facilities could be properly planned and engineered, greater control is possible, and site operation is better supervised; (3) valuable resources could be reclaimed from the dredging operation and donated or sold for productive use; and (4) expense and public objection to new disposal areas would be greatly reduced due to reduction in excessive land-use requirements. Research completed to date has identified methods of separating, drying, and rehandling dredged material, legal and policy constraints regarding marketing and disposition of the material, and potential use of dredged material for landfill and construction purposes. (See also W77-09325) (Humphreys-ISWS)
W78-03228

HYDROLOGIC AND SEDIMENTOLOGIC STUDY OF THE OFFSHORE DREDGE DISPOSAL AREA, SAVANNAH, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, GA.
G. F. Oertel.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 194-219, December 1976. 10 fig, 2 tab, 2 ref.

Descriptors: *Atlantic Ocean, *Dredging, *Disposal, *Georgia, *Spoil banks, On-site investigations, Beds, Sands, Shape, Coasts, Currents(Water), Tidal waters, Surveys, Sediment distribution, Sediments, Spatial distribution, Bottom sediments, Deposition(Sediments), Topography, Sand waves, Movement, Tidal effects, *Savannah(Ga).

In 1973, 1.15 million cu m of dredged material were deposited 13.0 to 16.0 km seaward of the Savannah River entrance. The disposal produced a 0.75 m average increase in bottom elevation in a predetermined area. In the southeastern portion of the disposal area the dredged material formed a mound composed of 30% coarse sand which extended 6 m above the bottom to a depth of minus 9 m (MLW). The coarse sand accumulated in the area directly below the disposal path of the hopper dredge. Fine-grained dredged material was dispersed by coastal and tidal currents away from the disposal path of the dredge. The percentage of fine and very fine sand increased to over 90% in the deeper water around the mound. More bioturbation (biologic mixing of sediment) was apparent in the fine-grained than in the coarse-grained material. The stability of the sediment in the disposal area was closely related to water depth and physical energy. Near-bottom currents were generally too weak (less than 12 cm/s) to rework dredged material once it was deposited. The upper portions of the mound were most susceptible to change because of their proximity to wave surge and stronger currents (up to 30 cm/s). During a northeast storm season in 1973 (September through November) the mound became asymmetrical and migrated approximately 0.54 kilometers in a southerly direction. (See also W78-09325) (Humphreys-ISWS)
W78-03233

AQUATIC DISPOSAL OF DREDGED MATERIAL: RELEASE OF CONTAMINANTS DURING AND AFTER DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5B.
W78-03234

SELECTIVE ANALYTICAL PARTITIONING OF SEDIMENTS TO EVALUATE POTENTIAL MOBILITY OF CHEMICAL CONSTITUENTS DURING DREDGING AND DISPOSAL OPERATIONS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5A.
W78-03259

EVALUATION OF SAFETY FACTORS WITH RESPECT TO OCEAN DISPOSAL OF WASTE MATERIALS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W78-03269

A SUMMARY OF THE TEST PROCEDURES AND OPERATIONAL DETAILS OF A DELAWARE RIVER AND AN OCEAN DUMPING POLLUTION MONITORING EXPERIMENT CONDUCTED AUGUST 28, 1975,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-03280

MARKING THE SEA SURFACE WITH ARTIFICIAL SEA SLICKS AND FLUORESCENT DYES TO AID SEARCH AND RESCUE OR OCEAN DUMPING SURVEILLANCE OPERATIONS,
Naval Research Lab, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-03282

ULTIMATE DISPOSAL OF OIL AND HAZARDOUS MATERIALS,
Coast Guard Office of Research and Development, Groton, CT.
J. F. Leary.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 137, Price codes: A04 in paper copy, A01 in microfiche. Report No. CG-D-36-76, October 1975. 70 p, 3 fig, 3 tab, 5 append.

Descriptors: *Oil pollution, *Waste disposal, *Water pollution control, Water quality control, Storage requirements, Hazardous substances.

The state of the art methods to store and dispose recovered oily water and other hazardous materials which are discharged and enter United States inland and coastal waters is outlined. The kinds of materials likely to be recovered and techniques/systems for their storage and ultimate disposal are identified. Particular emphasis is placed on the need to establish the most cost effective and environmentally suitable ultimate disposal system for use by the U.S. Coast Guard. (Sinha-OEIS)
W78-03283

ENZYMATIC TREATMENT OF PRIMARY MUNICIPAL SLUDGE WITH TRICHODERMA VIRIDE CELLULASE,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
G. V. Cinq-Mars, and J. Howell.
Biotechnology and Bioengineering, Vol 19, No 3, p 377-385, March, 1977. 3 fig, 9 ref, 3 tab.

Descriptors: *Municipal wastes, *Sludge treatment, *Hydrolysis, *Cellulose, *Enzymes, Wastes, Waste treatment, Solid wastes, Water pollution sources, Sludge, Filtration, Fungi, Trichoderma viride, Cellulase, Cellobiose, Ultrafiltration, Filter paper.

Enzymatic hydrolysis of the cellulose in sterilized primary municipal sludge (raw sludge heated at 120C for 30 min, 100 ppm merthiolate added, and homogenized in a Waring blender for 2 min) by Trichoderma viride cellulase in a batch-batch membrane reactor achieved 75% conversion of cellulose to cellobiose in 24 hr. The gel-like characteristic of primary municipal sludge was changed to that of a slurry of fine particles in less than 2 hr, eliminating clogging of the reactor's membrane during ultrafiltration of the sludge. Trichoderma viride cellulase with a filter paper activity (FPA) of 2 was obtained on a growth medium of raw municipal sludge (compared to a FPA of over 4 which is attained on a defined medium of similar strength). (Swichtenberg-IPC)
W78-03292

SLUDGE INCINERATION IN A PAPER MILL USING NATURAL GAS AS SUPPORTING FUEL (SCHLAMMVERBRENNUNG MIT ERDGAS ALS STUTZFEUER IN EINER PAPIERFABRIK),
Technisch Werke der Stadt Stuttgart A.G. (West Germany).
G. Strotbek, and H. Weissbach.
Gas- und Wasserfach, Gas/Erdgas, Vol. 118, No. 3, p 109-112, 1977. 2 fig, 2 tab.

Descriptors: *Sludge treatment, *Incineration, *Pulp wastes, *Natural gas, *Fuels, Wastes, Waste treatment, Water pollution sources, Foreign countries, Europe, Sludge, Water pollution control, Sludge disposal, Pulp and paper industry.

A new way of handling the sludge stemming from primary and secondary effluent treatment at a German paper mill had to be developed after suitable dumping sites had been filled. In the new system centrifugally thickened sludge (70-75% water, about 50% of the dry substance is organic material) is fed by a bucket conveyor to a multitier oven, which is divided into three zones: a sludge-drying zone (tiers 1-6), and combustion zone (tiers 7-8), and a cooling zone (tiers 9-10). For better control of the process, the sludge is burned at a level of dewatering below that at which combustion would be self-sustaining. Hot gases from a natural gas-fired burner pass in counter-current fashion through the multitier oven to equalize the heat balance. (Speckhard-IPC)
W78-03297

REAGENTLESS PROCESS FOR DEWATERING ACTIVATED SLUDGE (BEZREAGENTNYI PROTSESS OBEZVOZHIVANIYA AKTIVNOGO ILA),
Kotlasskii Tsellyulozno-Bumazhnyi Kombinat (USSR).
G. M. Zaleshina, A. T. Oleinik, and N. F. Dybtsyna.
Tsellyuloza, Bumaga, Karton Referativnaya Informatsiya, No. 11, p 5-6, April, 1977.

Descriptors: *Activated sludge, *Sludge treatment, *Dewatering, *Electric currents, Wastes, Waste treatment, Water pollution treatment, Water pollution sources, Bacteria, Sludge, Solid wastes.

The introduction of an electric current into a sludge suspension contributes to the dewatering process. Passing the current through the sludge suspension does not, however, cause the destruction of bacteria which comprise the biocoenosis of the activated sludge, thus permitting repeated use for biological purification. Water/sludge separation should be improved, and the amount of sludge carried away in the purified effluent should be reduced as a result of the electric current treatment. The oxygen-regeneration potential for the electrochemical effluent treatment system is reduced by the short-term application of an electric discharge. (Sykes-IPC)
W78-03319

FINAL REVISION OF REGULATIONS AND CRITERIA FOR OCEAN DUMPING.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03369

EFFECT OF SPRAY IRRIGATION OF MUNICIPAL WASTEWATER ON NITROGEN TRANSPORMATIONS IN SOIL,
Ohio State Univ., Columbus. Dept. of Agronomy.
R. H. Miller, S. S. Brar, and T. J. Logan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 661, Price codes: A04 in paper copy, A01 in microfiche. Ohio Water Resources Center, Columbus, Project Completion Report No. 495X, (1977). 59 p, 21 fig, 15 tab, 25 ref, 2 append. OWRT B-059-OHIO(1).

Descriptors: *Nitrification, *Denitrification, *Waste water disposal, Soil microbiology, Water pollution, Sewage effluents, Ohio, Penn State Univ Wastewater Management Study, *Nitrogen mineralization, Available soil carbon, Plant residue.

Nitrogen transformations on soils of the Pennsylvania State University Wastewater Management Study were investigated for Reed Canarygrass, Old Field, Hardwood Forest and Gameland sites. Nitrogen mineralization rates, plotted as N mineralized versus t1/2 for the 26 week mineralization period were linear for 0-7.5 cm soil depths for all sites, but only for eight weeks at the 7.5-15 cm depth, reflecting the depletion of mineralizable N compounds at lower depths. N mineralization was higher for wastewater treated sites on Hublersberg soil and represented 3.0-3.5% of the soil N; rates were 5-9 times greater on the coarse-textured Morrison soil, indicating a greater danger of NO3 leaching with wastewater treatment of this type of soil. Nitrification was rapid on all treated soils, absent on Old Field and Gameland control sites and slow on Hardwood Forest sites due to low soil pH. Denitrifying activity was low on all sites even in surface layers; glucose-amended soils, however, gave rapid denitrification, indicating a lack of available carbon. This was supported by measurements of soluble and mineralizable carbon in soil. Plant residues taken from the site supplied available carbon for denitrification for 2-4 weeks only.
W78-03424

SIXTH SEMIANNUAL INTERAGENCY BRIEFING FEBRUARY 1976, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 5G.
W78-03477

LANDSCAPE CONCEPT DEVELOPMENT FOR CONFINED DREDGED MATERIAL SITES,
Mann (Roy) Associates, Inc., Cambridge, MA.
R. Mann, W. A. Niering, R. Sabbatini, and P. Wells.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-a026 684, Price codes: A08 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station Contract Report D-75-5, December 1975. 168 p, 3 fig, 10 tab, 71 ref. WES DACW39-74-C-0104.

Descriptors: *Dredging, *Spoil banks, *Landscaping, Waste disposal, Landfills, Dikes, Earthworks, Soils, Vegetation, Shrubs, Trees, Windbreaks, Terracing, Planning, Land use, *Dredged material disposal, Disposal operations, Confined land disposal.

Confined dredged material disposal (CDMD) facilities have long been recognized as environmentally problematic for a number of physical, chemical, biological, and aesthetic reasons. The specific problem area of the aesthetic development of CDMD facilities is one that has received insufficient attention to date. The purpose of this study was to provide guidance for landscape development of CDMD sites. The approach of this study was: (1) to examine the principles and practices of CDMD operations and the associated constraints and potentials to landscape development, through a review of the literature, and to extend knowledge through field reconnaissance and data gathering in selected Corps Districts and from other sources of scientific and technical information; (2) to document landscape techinques directly applicable to the development of CDMD facilities, including those techniques abstracted from research of analogous facilities; and (3) to synthesize the information derived from the first two steps into appropriate landscape development guidance that can serve as an aid in the planning and design of CDMD sites. Landscape development, if considered in the earliest project stages, can aid CDMD planners and engineers in achieving effective resolution of aesthetic problems and site reuse questions while accomplishing dredged mateial disposal objectives in full. (Sims-ISWS)
W78-03478

LABORATORY STUDY OF AERATION AS A FEASIBLE TECHNIQUE FOR DEWATERING FINE-GRAINED DREDGED MATERIAL.
Environmental Engineering Consultants, Inc., Stillwater, OK.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 673, Price codes: A04 in paper copy, A01 in microfiche. Contract Report D-76-10, December 1976. 71 p, 14 fig, 8 tab, 12 ref, 1 append. DACW39-75-C-0123.

Descriptors: *Aeration, *Dewatering, *Dredging, Slurries, Silts, Laboratory tests, Air, Moisture content, Drying, Sludge disposal, Depth, Statistical methods, Feasibility studies, Water quality, Organic wastes, Biochemical oxygen demand, Chemical oxygen demand, Costs, Slurry columns, Fine-grained material, Airflow, Diffused aerators, Empirical equation.

The purpose of this study was to examine analytically and experimentally the potential feasibility for employment of aeration as a means of hastening the drying of fine-grained dredged material. Laboratory experiments were conducted on two materials in which 3- and 6-ft cylindrical columns of slurry were aerated at various airflow rates employing various initial moisture contents from 200 to slightly over 300%. It was shown that bubbling of diffused air into the slurry increased the rate of the moisture loss. Statistical analyses of the data led to an empirical formula for predicting mositure content from initial moisture content, depth, and unit airflow rate for the 2 materials. The equation provided reasonable predictions for results obtained in another laboratory-scale slurry pit. Costs for using diffused air to enhance drying under field conditions will be rather high but may be warrented depending on the cost of purchasing and developing new sites. It was concluded that the process showed sufficient potential ro recommend that field demonstration and design criteria studies be undertaken. (Visocky-ISWS)
W78-03480

NUMERICAL MODEL RESULTS OF DREDGED MATERIAL DISPOSAL AT TEN PROPOSED OCEAN DISPOSAL SITES IN THE HAWAIIAN ISLANDS,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics Lab.
For primary bibliographic entry see Field 5B.
W78-03483

EQUILIBRIUM OPERATION OF SUBSURFACE ABSORPTION SYSTEMS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
F. W. Kropf, R. Laak, and A. K. Healey.
Journal Water Pollution Control Federation, Vol. 49, No. 9, p 2007-2016, September, 1977. 6 fig, 3 tab, 27 ref.

Descriptors: *Soil physical properties, *Permeability, *Infiltration rates, *Return flow, *Slime, Tertiary treatment, Waste water disposal, Soil amendments, Soil treatment, Soil microorganisms, Soil disposal fields, Soil water movement.

Land application of waste water as a means of tertiary treatment and disposal may be hindered by reductions in waste water absorption by soils due to clogging of the soil interstices and the production of a biological mat. The objectives of this study were to examine the infiltration rate through the clogging mat and to develop design and operational criteria for subsurface absorption systems which could operate a equilibrium on a long-term basis. Experimental aspects of the laboratory-scale studies are discussed, including: test samples, selection of soils, preparation and packing of soil columns, flooding schedules, improved (tall) soil columns, sidewall infiltration, and operation of the model. The studies evaluated continuous vs. intermittent flooding, characteristics and breakthrough of the slime layer, changes in hydraulic gradient, the influence of soil characteristics, sidewall vs. bottom infiltration, extended continuous inundation, and long-term acceptance rate. Results indicated that continuous inundation did not produce a higher infiltration rate than intermittent dosing and that infiltration rate was related to the hydraulic gradient. Studies also indicated that infiltration surfaces were not permanently clogged. Reductions in infiltration by the presence of a slime layer were independent of the soil porosity. Infiltration rates of 10-20 mm/day (0.2-0.5 gpd/sq ft) are predicted for all wetted surfaces. (Schulz-FIRL)
W78-03507

SEWAGE SLUDGE AND HOW TO SELL IT,
I. M. Knapp.
The American City and County, Vol 92, No 10, p 63-65, October, 1977. 1 fig, 1 tab.

Descriptors: *Drying, *Fertilizers, *Dewatering, *Sludge disposal, *Nutrients, Soil amendments, Sewage sludge, Sludge treatment, Costs, Economics, Municipal wastes, Waste water treatment.

An $800,500 sludge processing plant capable of producing a dry pelletized soil conditioner from municipal sludge is being used by the city of Largo in Pinellas County, Florida. The sludge/treatment disposal system was designed as part of a 3.0-mgd expansion project for the existing sewage treatment plant. Experiences in the marketing and promotion of Largo's dried pelletized sludge, sold as 'LarGrow', are described. Initial production costs were $140/ton while the expected revenues from the sale of the soil conditioner were $80-

100/ton. The addition of a sludge prethickener/conditioner process is expected to reduce the operating costs to the $50-80/ton range. An additional advantage presented by the disposal system is that the sale of 'LarGrow' to residents of the surrounding area eliminates transportation and application costs for the treatment plant. After thickening in three in-ground conical tanks, the wet sludge cake is combined with previously dried sludge to reduce the moisture content. A drum dryer is used to remove the remaining moisture. Some of the dried sludge is retained for mixing with incoming thickened sludge, and the remainder is conveyed to a dry product storage bin. The uniformly-sized pelletized product is packed in self-sealing, three-ply, poly-lined bags. (Schulz-FIRL)
W78-03511

CO-DISPOSAL OF SEWAGE SLUDGE AND SOLID WASTES--IT WORKS,
Environmental Protection Agency, Washington, DC. Resource Recovery Div.
D. B. Sussman.
The American City and County, Vol 92, No 10, p 55-58, October, 1977. 1 fig.

Descriptors: *Incineration, *Sludge treatment, *Sludge disposal, *Solid wastes, *Organic matter, Waste disposal, Energy, Fuels, Heat treatment, Municipal wastes, Waste water disposal, Waste water treatment.

Since municipal sludge has a heat value of 10,000 BTU per lb of dry solids and is autogenous at a moisture:solids ratio of 70:30, co-disposal of solid waste and municipal sludge is suggested so that the energy produced by the combustion of solid waste can be used to dewater sludge to its autogenous point. Basic approaches to co-disposal include the use of sludge incinerators with the organic portion of solid wastes as a fuel to dry, burn, and reduce the volume of sludge; and the use of a solid waste incinerator, solid waste-fired steam generator, or waterwall combustion unit to burn dewatered sludge. The use of a fluidized bed furnace for co-disposal in an EPA-supported demonstration at Franklin, Ohio, is described. The facility at Franklin was also designed to recover a low grade paper fiber, ferrous and nonferrous metals, and glass from the solid waste stream and to use fuel derived from the non-recoverable organic portions of the waste to operate the sludge incinerator. Th modification of an existing multiple hearth sludge incinerator to accept refuse-derived fuel and operate in either an incineration or pyrolysis mode at a facility in Concord, California, is described. Experiences with the use of a solid waste incinerator as a sludge volume reduction unit are described for Ansonia, Connecticut; Norwalk, Connecticut; Holyoke, Massachusetts; and other municipalities. The direct use of heat from burning solid waste to dewater and burn sludge was demonstrated in Glen Cove, New York. (Schulz-FIRL)
W78-03512

CENTRIFUGAL DEWATERING OF MUNICIPAL AND INDUSTRIAL SLUDGE,
Washington State Univ., Pullman.
T. Asano, T. Suzuki, and N. Hayakawa.
Water and Sewage Works, Vol 124, No 9, p 130-135, September, 1977. 9 fig, 3 tab.

Descriptors: *Dewatering, *Sludge treatment, *Polymers, *Centrifugation, *Separation techniques, Coagulation, Filtration, Suspended solids, Sludge disposal, Municipal wastes, Industrial wastes, Equipment, Waste water treatment.

Sludge dewaterability was investigated with a horizontal continuous cylindrical-conical centrifuge which was manufactured by Nishihara Environmental Sanitation Research Corporation Limited in Tokyo, Japan. The Model SD-700P centrifuge includes a sludge feed pump, chemical feed pump, chemical mixing tank, flow meters, atmospheric moisture control unit, effluent inspection window, and an operation control panel. Results of the use of the centrifuge with various types of municipal, industrial, and water treatment sludges are presented. Flonac, a cationic organic polymer, was evaluated with regard to improving suspended solids recovery. With digested mixed, primary and activated sludges, solids recovery was 48-80% without polymer addition and over 99% with the addition of Flonac. Suspended solid capture for raw primary sludge was 73-96% without Flonac and over 98% with polymer addition. Polymer addition to mixed raw primary and activated sludges increased solids recovery from 61% to approximately 98%. Suspended solids capture with activated sludge was 40-97% without polymer addition and more than 98% recovery with the polymer. Suspended solids capture with aerobic digested sludge was increased from 55% to 98% with the addition of a polymer. A nonionic organic polymer (Aquafloc 30) and an anionic polymer (Aquafloc 305) significantly improved the dewaterability of water filtration plant sludge. Process and operational variables which may affect sludge dewaterability, such as sludge feed rate, sludge feed concentration, solids recovery, and automatic operation, are discussed. (Schulz-FIRL)
W78-03515

AWARD WINNING PLANT UTILIZES SPRAY IRRIGATION,
Dufresne-Henry Engineering Corp., North Springfield, VT.
J. M. McCarthy.
Public Works, Vol 108, No 11, p 60-61, November, 1977.

Descriptors: *Spray irrigation, *Return flow, *Treatment facilities, *Sewage, Pipes, Irrigation practices, Waste water disposal, Municipal wastes, Waste water treatment, Effluents.

The Dufresne-Henry Engineering Corporation has designed a $2,050,000 waste water treatment and disposal facility for the town of Dover, a small ski resort in Vermont. A $1.3-million tributary system with 9.5 miles of sewers and two lift stations was installed for the spray irrigation/land treatment system. Comminutors and dual oxidation canals followed by clarification and effluent chlorination are used to treat the waste water prior to disposal. A liquid-solids gravity separator with polymer thickening is used to dewater the sludge prior to disposal as fertilizer or at a landfill. Design for the facility required accommodation for large variations in flow on a seasonal basis, as well as on a weekend-weekday basis due to the ski area patronage. Two 18.2-million-gal earthen ponds were constructed to equalize variations in plant volumetric loading and to hold effluent during periods when spray irrigation is not allowed because of saturated ground conditions. Spray irrigation over a 55-acre field is accomplished by a distribution system which consists of 4 miles of 2, 3, and 4 inch galvanized steel piping supported by 1500 wooden posts. Irrigation during the winter is accomplished by fixed spray heads spaced at 25-ft intervals, while irrigation during the summer is accomplished by rotary spray heads at 50-ft intervals. An effluent application rate of 0.25 inch/hr is controlled by the pressure and flow rate of the effluent from the spray heads. (Schulz-FIRL)
W78-03519

ENERGY GUZZLING SEWAGE PLANT WILL FUEL ITSELF.
For primary bibliographic entry see Field 5D.
W78-03522

SLUDGE COMPOSTING PROJECTS IN U.S. CITIES,
Agricultural Research Service, Beltsville, MD. Biological Waster Management Lab.; and Agricultural Research Service, Beltsville, MD. Soil Nitrogen Lab.
E. Epstein.
Compost Science, Vol 18, No 5, p 5-7, September/October, 1977.

Descriptors: *Sludge treatment, *Sludge digestion, *Treatment facilities, *Sewage treatment, *Fertilizers, Sludge disposal, Recycling, Sewage treatment, Waste water treatment.

Recent legislative action, increased public awareness of waste recycling, improved technology, and increased costs of sludge disposal by incineration have led to increased interest in sewage sludge composting in the United States. Current sludge composting methods used in the United States include the windrow system and the Beltsville Aerated Pile Method. In the Beltsville process a mixture of sewage sludge and bulking material such as wood chips is composted in a stationary pile for 21 days while air is drawn through the pile. Design details of a Beltsville composting system used at the Beltsville Agricultural Research Center in Maryland are presented. An extended modification of the aerated pile was developed to reduce the compost area, the amount of blanket material required, and the woodchip requirement for the pile base. Additional studies are being conducted to examine the effects of pile height on composting processes, the feasibility of indoor composting, and possible uses for compost. Among cities in the United States which are now using or have used some type of composting for treatment of sludge are Durham, North Carolina; Bangor, Maine; Camden, New Jersey; Merrimac, New Hampshire; and Chicago, Illinois. Full-scale facilities for composting of 120 tons of wet sludge per day are currently under construction in Windsor, Ontario, Canada. (Schulz-FIRL)
W78-03525

SLUDGE DISPOSAL TO LAND 'GOOD FARMING PRACTICE'.
Surveyor, Vol 150, No 4447, p 22, September, 1977. 1 tab.

Descriptors: *Fertilizers, *Sludge disposal, *Heavy metals, *Nutrient removal, *Waste water disposal, Food chain, Waste water treatment.

Details of a report by the British National Water Council's working party on the disposal of sewage sludge to land are presented. The report concluded that, in general, land application of sewage sludge for agricultural purposes was advantageous because of the large quantities of nutrients, particularly nitrogen and phosphorus, present in municipal sludge. Tentative guidelines on application rates to produce maximum agricultural benefits and minimum deleterious effects are presented. Accumulation of heavy metals in plants as a result of sewage sludge application is discussed. Provisional limits for Zn, Cu, Ni, Cr, Cd, Pb, Hg, Md, B, As, and Se in sludge and possible sources are listed in tabular form. The effects of sludge properties on its adaptability to land application are discussed. Further areas of research recommended by the working party include a literature survey, data collections on the quantity and quality of sludges slated for land disposal, studies on the nutrient value and heavy metal concentrations of sludge, analytical techniques for rapid determinations of metals in sludges, and a cost-benefit analysis of land application. (Schulz-FIRL)
W78-03527

SANITATION FOR THE DEVELOPING NATIONS.
For primary bibliographic entry see Field 5D.
W78-03530

GREYWATER FOR THE GREENHOUSE,
Clivus Multrum Inc., Cambridge, MA.
For primary bibliographic entry see Field 5D.
W78-03534

WASTEWATER RENOVATION AND SLUDGE UTILIZATION ON LAND INCLUDING QUESTIONS OF OWNERSHIP,
Environmental Protection Agency, Chicago, IL. Office of Research and Development.
J. M. Walker.
Compost Science, Vol 18, No 5, p 8-15, September/October, 1977. 3 fig, 6 tab, 16 ref.

Descriptors: *Return flow, *Waste water disposal, *Sludge disposal, *Soil amendments, *Fertilizers, Sludge treatment, Operation and maintenance, Treatment facilities, Legal aspects, Municipal wastes.

Land application of municipal waste water as a means of treatment and disposal has been cited as a cost-effective, environmentally sound alternative to the construction of new or improved waste water treatment facilities. Various aspects of land renovation of waste water and application of sludge are discussed, and the feasibilities of public vs. private ownership are examined. Sludge and waste water characteristics are discussed with respect to land requirements. Advantages and disadvantages of public vs. private ownership of land and operation are presented. The Muskegon County, Michigan, waste water treatment system is presented as an example of a publicly owned and operated treatment system which uses land application for the treatment of waste water. The Cooperative Sewage Utilization Association for the treatment and land application of municipal waste water from the city of Braunschweig, Germany, is described as a joint public-private interest. The Fulton County, Illinois, public operation for the treatment of liquid sludges from the Metropolitan Sanitary District of Chicago is described. The public-private land application of sludge in West Hertfordshire, England, is discussed. Research on land application and uses of sludge and waste water are described. (Schulz-FIRL)
W78-03535

ACTIVATED SLUDGE TREATMENT, GENERATION, AND DISPOSAL,
Delaware Univ., Newark.
For primary bibliographic entry see Field 5D.
W78-03538

A LOOK AT NEWER METHODS FOR DEWATERING SEWAGE SLUDGES,
Municipal Environmental Research Lab., Cincinnati, OH.
R. V. Villiers, and J. B. Farrell.
Civil Engineering-ASCE, Vol 47, No 12, p 66-71, December, 1977. 9 fig, 4 tab, 11 ref.

Descriptors: *Dewatering, *Filtration, *Separation techniques, *Filters, *Ultimate disposal, *Incineration, Equipment, Sludge treatment, Sludge disposal, Waste water treatment.

Although incineration has been widely used as a sludge disposal technique, high fuel costs have begun to render the process uneconomical unless the sludge can be first dewatered to a solids concentration of greater than 30%. This value is critical, since the sludge will burn autogenously above a solids concentration of 30%. Although vacuum filtration and centrifugation can dewater sludge to about 20% solids, the amount of auxiliary fuel required for incineration is still considerable. The Klein belt filter press was developed in Europe in the early 1960's and first introduced into the United States in 1971. Pilot studies at the Allegheny County waste water treatment plant in Pittsburgh, Pennsylvania, have indicated that the belt filter press is capable of producing a sludge cake of 30% solids or greater, 5-12% higher than expected with a vacuum filter. Other filter presses which have achieved solids concentrations as high as 44% include a twin roller press, a high-solids filter, screw presses, and diaphragm filter presses. Design data and operating experiences are presented for various commercially available filter presses. (Schulz-FIRL)
W78-03550

COMPLETE SERVICE FOR SLURRY RECYCLING.
Water and Waste Treatment, Vol 20, No 8, p 44, August, 1977.

Descriptors: *Fertilizers, *Sludge disposal, *Sludge treatment, *Nutrient removal, *Equipment, Sewage disposal, Storage tanks, Pumping, Municipal wastes, Waste water treatment.

Molex Limited produces a complete system for land disposal of digested sludge as a fertilizer and soil conditioner. Used in England, the method has provided a viable method of sludge disposal which also returns essential nutrients to the land. Much of the sludge transportation is accomplished by Molex road tankers with capacities ranging 1,500-4,600 gallons. A Molex HD 130/100 screw pump is used to convey the load to a 4,600 GRP Molex transfer vessel. For distribution over farm land, the sludge is pumped to agricultural slurry tankers of the 900-gal fiberglass or 1,200-gal single axle type. The tankers are equipped with flotation tires to minimize soil compaction and maximize the travel range of the road tanker. The screw pump has an output of 22,000 gph at 130 psi and 300 ft head and can be used during foul weather to pump the slurry into irrigation lines with multiple spreaders. The HD 130/100 can also be used as a diesel-driven mobile irrigation unit. (Schulz-FIRL)
W78-03553

SUBMARINE PIPELINE FOR RIVER WEAR.
Water and Waste Treatment, Vol 20, No 8, p 42, August, 1977.

Descriptors: *Outfall sewers, *Waste water disposal, *Sewage treatment, *Pipelines, Conveyance structures, Sewers, Treatment facilities, Waste water treatment.

The Northumbrian Water Authority in England has contracted the Engineering Division of John Laing Construction to install a sewage pipeline on the sea floor at Sunderland, Tyne and Wear. The project was initiated in an effort to improve the water quality of the River Wear. It includes an evaluation of the sewage outfall area about one mile south of Hudson Dock and fabrication and installation of 300 m of 1.4 m-diam piping at a total cost of 552,000 lbs. The pipe will be fabricated and joined in lengths of up to 120 m at Hudson Dock. The concrete-coated pipe will be transported to the sea on a steel slide and towed to the outfall site by tug. A pontoon-mounted crane equipped with a mechanical excavating grab will be used to excavate and backfill the pipe trench. The pipeline will be connected to an existing outfall pipe at one end and fitted with a concrete-coated diffuser at the other. Before disposal through the new pipeline, sewage will be screened at the Hudson waste water treatment plant. (Schulz-FIRL)
W78-03554

SEA OUTFALL FOR DORSET.
Water and Waste Treatment, Vol 20, No 8, p 38, 42, August, 1977.

Descriptors: *Outfall sewers, *Waste water disposal, *Sewage treatment, *Pipelines, *Conveyance structures, Sewage bacteria, Sewers, Treatment facilities, Waste water treatment.

Plans for a drainage system and sea outfall have been recently adopted by the Wessex Water Authority in England as a solution to problems associated with seven existing outfalls in the Weymouth and Portland areas. Extensive investigations prior to the development of a final design will evaluate environmental conditions before and after the construction of the proposed outfall. Studies will be conducted to select the most appropriate location and design. The length of the outfall has been tentatively set at 1,200 m. The fate and distribution of sewage bacteria from the outfall site will be assessed. Pretreatment requirements will also be evaluated. The discharge of ground and screened domestic effluents via an outfall was chosen over the more costly option of construction of inland waste water treatment facilities. Concern has been voiced over possible damage to Chesil Beach by the 140-ft deep outfall tunnel. The total cost for sewers, pumping stations, headworks, and the sea outfall is projected at 8,800,000 pounds. (Schulz-FIRL)
W78-03557

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W78-03564

POLYCYCLIC AROMATIC HYDROCARBONS IN AGRICULTURAL SOIL (POLYZYKLISCHE, AROMATISCHE KOHLENWASSERSTOFFE IN LANDWIRTSCHAFTLICH GENUTZTEN BODEN),
Mainz Univ. (West Germany). Hygiene Inst.
For primary bibliographic entry see Field 5B.
W78-03566

DETERMINATION OF HEAVY METALS IN SEWAGE-BASED FERTILIZER USING SHORT-LIVED ISOTOPES,
Surrey Univ., London (England). Dept. of Physics.
For primary bibliographic entry see Field 5A.
W78-03571

WASTEWATER EFFLUENT DISCHARGE TO COOLING LAKES,
Texas Univ. at Austin. Dept. of Civil Engineering.
R. D. Taylor, J. E. Dailey,, and A. Rohlich.
Journal of the Environmental Engineering Division-ASCE, Vol 103, No EE5, p 907-918, October, 1977. 7 fig, 1 tab, 14 ref, 2 append.

Descriptors: *Waste water disposal, *Cooling water, *Municipal wastes, *Industrial water, *Water reuse, Multi-purpose projects, Effluents, Aquatic life, Water quality control, Eutrophication, Pilot plants, Waste water treatment, Environmental effects.

The large quantity of fresh water required for cooling lakes which are used to dispose of waste water from power plants, and the increasingly stringent regulations on discharge of municipal waste waters, have created interest in the use of treated municipal waste waters as makeup water in cooling lakes. Although waste water has been used in cooling towers, up to this point it has not been discharged directly to cooling lakes in the United States. Results of a field study at Lake Braunig, a man-made cooling lake near San Antonio, Texas, are presented. Much of the lake's makeup water is drawn from the San Antonio River which in itself contains a large portion of secondary effluent. The water quality and trophic state were monitored in Lake Braunig over a 12-month period. The program indicated that the lake was highly eutrophic, although still useful for recreational and power plant purposes. The dominant algal species within the ecosystem is suggested as the most important factor in the usefulness of a lake as a cooling water source. Problems associated with the full-scale discharge of waste water to cooling lakes include: carbonate scaling and dezincification of condensers, boiler water treatment, water quality limitation on recreational uses, and the quality of cool-

ing lake effluent released to receiving waters. (Schulz-FIRL)
W78-03575

HEAVY METALS TRANSPORT MODEL IN A SLUDGE-TREATED SOIL,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5B.
W78-03590

WASTEWATER TREATMENT THROUGH SOIL -- WITH SPECIAL REFERENCE TO SEPTIC TANK EFFLUENT TREATMENT,
ADI Ltd., Fredericton (New Brunswick).
T. Viraraghavan.
Journal of the Institution of Engineers (India), Vol. 57, Part EN 3, p 95-102, June, 1977. 5 fig, 3 tab, 44 ref.

Descriptors: *Septic tanks, *Soil disposal fields, *Waste assimilative capacity, *Soil water movement, Groundwater, Path of pollutants, Soil contamination, Application methods, Waste water disposal, Municipal wastes.

Various hydrologic aspects which may influence waste water disposal with septic tank-soil absorption systems are discussed, including infiltration, percolation, evapotranspiration, and runoff. Major factors which control infiltration include soil porosity, moisture content, surface soil compaction, and the presence and type of vegetation. Studies on the effects of long-term, continuous water application on infiltration rates are described. Factors affecting percolation rates are discussed for saturated and unsaturated flow conditions. Modifications for septic tank effluent application to the Darcy equation are discussed for saturated and unsaturated percolation. Physical, chemical, and biological actions which help to remove pollutants from water as it travels through soil are described. Studies on filtration, the major physical mechanism by which waste water is purified in the soil, are described. Adsorption and ion exchange are discussed as chemical mechanisms. The role that soil bacteria play in waste water treatment is discussed. Typical characteristics of septic tank effluent are presented. Studies on the transport of sewage bacteria and viruses through soil systems are described. The fate and effects of specific chemical contaminants in septic tank effluents, including nitrogen, phosphates, surfactants, chloride, BOD, COD, and TOC, are discussed. (Schulz-FIRL)
W78-03620

MARINE POLLUTION: A MULTI-FACETED, MULTI-AGENCY DETECTION, RESEARCH AND ENFORCEMENT PROGRAM.
For primary bibliographic entry see Field 5G.
W78-03628

HISTORIC TURNING POINTS IN MUNICIPAL WATER SUPPLY AND WASTEWATER DISPOSAL, 1850-1932,
Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of History, Technology, and Urban Affairs.
For primary bibliographic entry see Field 5D.
W78-03629

MANAGEMENT MODEL FOR WASTEWATER DISPOSAL ON LAND,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
A. Koenig, and D. P. Loucks.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 321-330, 1976. 14 ref.

Descriptors: *Waste water disposal, *Surface irrigation, *Land reclamation, *Mathematical models, Drainage systems, Design criteria, Nitrogen, Water balance, Effluents, Estimating, Biochemical oxygen demand, Planning, Constraints, Equations, Systems analysis, Management, Soil water balance, Soil nitrogen balance, Maximization, Drainage capacity, Land application.

Presented is a method for examining the use of land for wastewater disposal. A simple nonlinear model is proposed which can assist in evaluating land disposal schemes for pretreated municipal wastewater effluent under different climatic conditions. For a given drainage capacity of the soil, an irrigation schedule is derived based on climatological data, and the minimum area for land application is found that will meet certain nitrogen concentration limitations in the drainage water. Results are obtained by first determining the soil-water balance and finally maximizing the nitrogen concentration in the irrigation wastewater which can be applied to the land. The independence of the soil-water balance subsystem is a convenient means for testing the soil assimilative capacity for a wide variety of hydrologic and climatological conditions. A numerical example is used to demonstrate application of the model. It is concluded that if the concentration of nitrogen in the drainage effluent is a limiting constraint, then the best policy in designing a land disposal scheme is to provide good drainage for a maximum throughput of wastewater effluent. (Bell-Cornell)
W78-03636

THE RELATIONSHIP BETWEEN THE BORON CONCENTRATION OF EAST LANSING MUNICIPAL WASTEWATER AND RETENTION TIME THROUGH THE MICHIGAN STATE UNIVERSITY WATER QUALITY MANAGEMENT PROJECT UNDER CONTINUOUS FLOW CONDITIONS,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 5A.
W78-03680

DISPOSAL OF COAL PREPARATION WASTES: ENVIRONMENTAL CONSIDERATIONS,
Los Alamos Scientific Lab., NM.
E. M. Wewerka, J. M. Williams, and N. E. Vanderborgh.
Available from the National Technical Information Service, Springfield, VA 22161 as LA-UR-762198, Price codes: A01 in microfiche. Report No. LA-UR-76-2198, 1976. 7 p, 17 ref. 761016--2.

Descriptors: *Environmental effects, *Coal mine wastes, Waste dumps, *Waste disposal, Drainage effects, Public health, Hazards, Air pollution, Water pollution sources, Trace elements, Waste storage, *Hazard assessment, Waste management, Coal preparation.

Over 3 billion tons of coal preparation wastes have accumulated in the U.S., and the current annual rate of waste production of 100 million tons is expected to double within a decade. The total number of active and abandoned coal waste dumps is estimated at between 3,000 and 5,000, and about one half of these pose some type of health, environmental, or safety problem. Structural weaknesses in coal refuse banks have led to tragic landslides; coal refuse dumps are one source of highly mineralized and acidic drainage which affects more than 10,000 miles of U.S. streams and waterways; and the 300 or so burning waste banks are considered a major source of air pollution. There is also growing concern about possible environmental effects from trace elements in he coal waste materials. Prevention and control measures suggested include dump foundation design, waste segregation by physical characteristics, proper grading and compaction of wastes with provision for adequate drainage, restriction of air and water influx through wastes, water treatment, and cooling or sealing of fire areas. Although corrective measures are available for some forms of coal refuse contamination, difficulties in preventing and controlling contamination are predicted to increase concurrently with national usage of cleaned coals. (Wares-IPA)
W78-03686

POSSIBILITIES FOR TREATING WASTE-WATERS GENERATED IN ELECTROPLATING SHOPS TO AVOID SPECIAL WASTES--METAL RECOVERY IN PLACE OF SLUDGE DISPOSAL. PART III (MOEGLICHKEITEN ZUR BEHANDLUNG GALVANISCHER ABWAESSER UNTER VERMEIDUNG VON SONDERABFAELLEN--METALLRUECKGEWINNUNG STATT SCHLAMMDEPONIE. TEIL III),
For primary bibliographic entry see Field 5D.
W78-03689

5F. Water Treatment and Quality Alteration

PRECIPITATION PRODUCTS IN THE FE(II) AND TRISODIUM-PHOSPHATE SYSTEM AT PH 2.5-13.0, (IN GERMAN),
Goettingen Univ. (West Germany). Abt. Oekochemie.
R. Kickuth, and K. Tubail.
Geoderma 16(5), p 433-442, 1976.

Descriptors: *Iron, *Chemical precipitation, *Phosphates, Pollutant identification, Analytical techniques, Hydrogen ion concentration, *Trisodium phosphate, Water analysis, Water purification, Water treatment, Potable water.

The precipitation of Fe(II)-phosphates and -hydroxides by interactions of Fe(II)-sulfate and Na3PO4 in aqueous solutions of pH 2-13 at room temperature was investigated. The results of potentiometric titration were similar to those reported in literature. No stoichiometric compound was found among the precipitation products in the whole pH-range, e.g., FeHPO4, Fe3(PO4)2 and Fe(OH)2. All precipitation products contain PO4-groups and OH-groups in various proportions depending on the pH during their formation. FeHPO4 may be regarded as a hypothetical initial compound, when precipitation begins at about pH 2 and Fe(OH)2 as the end-product at very high pH-values, respectively. Fe3 (PO4)2 does not occur except in the form of parially hydrolyzed species in a neutral milieu. All these compounds form a continuous system of non-stoichiometric phosphates and hydroxydes, respectively. The situation is even more complicated with Na present in solutions, and this is not due to surface adsorption. The composition of the precipitates plotted against the pH-values do not show some peculiarities, which clarly divide the field of precipitation into 2 regions: that of non-stoichiometric phosphates and that of non-stoichiometric hydroxides. The transition point is defined as a pH-value at which PO4 and OH-groups in the precipitates are interchangeable most easily. This occurs at a pH of 8.8. The composition of this transition product may be written as FeOH(P'4)o,33. --Copyright 1978, Biological Abstracts, Inc.
W78-03454

WATER PURIFICATION SYSTEM UTILIZING ULTRAVIOLET RADIATION,
H. M. Ross.
U.S. Patent No. 4,017,734, 4 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 957, No 2, p 808, April 12, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality control, Ultraviolet radiation, Flow control, Light.

A water purification system utilizes an ultraviolet generator encased in a quartz cylinder to irradiate water flowing through a passageway defined by the surface of the quartz cylinder and an outer casing. An ultraviolet sensor and control circuit shuts off the water when the ultraviolet radiation level drops below a predetermined level. A flow-sensing switch controls an ultraviolet dimming circuit which reduces the generator output when water is not flowing. Water flow is controlled by reduced annular spaces at the inlet and outlet of the passageway and the quartz cylinder and the ultraviolet sensor are kept free of sedimentation by wiper blades. (Sinha-OEIS)
W78-03598

APPARATUS FOR THE ELECTROLYSIS OF WATER WHICH OPERATES UNDER PRESSURE,
Societe de Recherches Techniques et Industrielles, (France). (Assignee).
L. Mas.
U.S. Patent No. 4,039,421, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 248, August 2, 1977.

Descriptors: *Patents, *Water treatment, *Electrolysis, Separation techniques, Oxygen, Hydrogen, Electrochemistry, Equipment.

An apparatus for the electrolysis of water which operates under pressure and can be started up without injecting nitrogen is described. A set of valves arranged in the electrolyte circulation circuit upstream and downstream of the stack of electrolytic cells isolates the stack from the remainder of the apparatus when the apparatus has finished operations, with the result that a specific pressure is maintained within the cells until the apparatus is next started up. (Sinha-OEIS)
W78-03602

ION-EXCHANGE PROCESS FOR DESALTING WATER AND SUBSEQUENT REGENERATION OF THE ION EXCHANGERS,
CKD DUKLA, Prague (Czechoslovakia). (Assignee).
For primary bibliographic entry see Field 3A.
W78-03607

WATER PURIFICATION DEVICE,
Lever Bros. Co., New York. (Assignee).
B. H. Bory, and A. B. Kessler.
U.S. Patent No. 4,039,444, 11 p, 6 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 255, August 2, 1977.

Descriptors: *Patents, *Water purification, *Water treatment, *Water quality control, Organoleptic properties, Domestic water, Equipment.

A device for the purification of water and methods for its use are disclosed. The device comprises a closed container substantially porous to water, a purification agent and an ingredient dispersed in the purification agent for the purpose of inhibiting fine particles of the agent from escaping the container when the device is immersed in water. The inhibitory ingredients include certain modified starches, wood flour and aluminium soap. The device is especially useful in removing incipient impurities from drinking water than can elude customary water treatment and render drinking water organoleptically unsatisfactory. (Sinha-OEIS)
W78-03609

INTERNATIONAL COOPERATION IN STUDYING THE HEALTH ASPECTS OF ORGANIC CONTAMINANTS IN INDIRECTLY REUSED WASTE WATER,
International Reference Centre for Community Water Supply, The Hague (Netherlands).
For primary bibliographic entry see Field 5C.
W78-03627

5G. Water Quality Control

BACTERIAL CONTROL OF AQUATIC ALGAL POPULATIONS,
Medical Coll. of Ohio at Toledo.
J. C. Burnham.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 569, Price codes: A06 in paper copy, A01 in microfiche. Ohio State University, Columbus, Water Resources Center, Completion Report No. 548, July 1977. 117 p, 12 fig, 5 tab, 39 ref, 7 append. OWRT B-051-OHIO(1).

Descriptors: *Algal control, Aquatic algae, *Cyanophyta, Electron microscopy, Oxygen requirement, Photosynthetic oxygen, *Toxins, Water quality control, *Bdellovibrio bacteriovorus, Cell lysis, *Photorespiration, Phormidium luridum, Synechococcus.

The effect is described of a toxic substance secreted by Bdellovibrio bacteriovorus ATCC15143 on two species of blue-green algae, Phormidium luridum var. olivacea and Synechococcus sp. This algal inhibitor, which had a molecular weight of less than 10,000 and was partially sensitive to protease activity, was examined for its potential as a naturally-produced algal control agent. The need for a moderate concentration of environmental protein for production of the toxin was demonstrated along with the requirement of alkaline conditions (pH 9.0 optimum) for antialgal activity. One of the primary findings was the unique photorespiratory process that is triggered by exposure of the blue-green algae to the toxin. This photorespiration was a totally light dependent process as dark respiration remained normal and occurred prior to the lysis of the algal cells. When the effects of the bdellovibrio produced inhibitor were compared with the action of a variety of known chemical redox inhibitors, the greatest similarity was to a mixture of amphotericin B and polymyxin B. Transmission electron microscopy indicated a distinct pathological breakdown of the algal cells that was dependent on the blue-green algal species being exposed to the toxin. A host independent mutant of B. bacteriovorus 15143 was isolated which produced a similar algal toxin. Finally, over 100 bacterial isolates from local water resources were evaluated for comparative blue-green algal lytic activity.
W78-03201

TEXTILE INDUSTRY EFFLUENTS--INSTRUCTIONS FOR PRACTICAL USE (TEXTIL-ABWASSER--WEGLEITUNG FUER DIE PRAXIS).
BWL-Gruppe der schweizerischen Textilindustrie; Basel, Switzerland, 1977. 10 p, 1 tab, 8 ref.

Descriptors: *Textiles, *Dyes, *Industrial wastes, *Effluents, *Filtration, Neutralization, Water pollution control, Toxicity, Waste water treatment, *Switzerland.

The legal guidelines and requirements in Switzerland for the handling of textile plant waste water are presented. The guidelines suggest that the industry make use of degradable and non-toxic products whenever and wherever possible, and that they require the treatment of the effluent before discharge from the plant. The treatment would include filtration to remove fibers and solids; adjustment of pH; equalization of the wastes over the entire week rather than allowing fluctuations of discharged quantities; and, if possible, the construction of company treatment plants. Toxic or dangerous substances should be stored in tanks rather than included in the effluent. (Schwartz-FIRL)
W78-03206

ACID MINE DRAINAGE TREATS SEWAGE DUMPED IN STREAMS.
Coal Age, Vol. 82, No. 11, p 23, November, 1977.

Descriptors: *Acidic water, *Mine wastes, *Sewers, *Environmental effects, *Floods, Disinfection, Acid mine water, Waste water treatment.

Sewage lines and treatment plants were heavily damaged during the Johnstown flood in Pennsylvania, and millions of gallons of raw sewage flowed daily into the Conemaugh River. The heavily acid-laden receiving streams in the area proved valuable in the partial disinfection of the untreated sewage, which otherwise could have presented a serious health hazard to downriver communities, including Pittsburgh. Problems of the nearby Windber sewer authority were caused by the loss of about 4.5 miles on interceptor. Since some areas along the sewer routes were washed down to bare rock during the flood, aerial pipelines are being considered as replacements. Officials have stated that since the sewage receives primary treatment through the acidic nature of the Conemaugh and Kiskiminetas Rivers and is further diluted by the Allegheny River, its effect on water quality in the Pittsburgh area is minimal. (Schulz-FIRL)
W78-03212

AUTOMATIC WATER-TREATMENT PLANT.
For primary bibliographic entry see Field 5D.
W78-03213

PRE-INSULATED PIPING SYSTEM USED FOR WATER AND TAILINGS AT CANADA'S FIRST ARCTIC MINE.
For primary bibliographic entry see Field 8G.
W78-03214

INDUSTRIAL EFFLUENT CONTROL AND CHARGES,
M. C. Dart.
Journal of the Institute of Water Pollution Control, Vol. 76, p 192-199, 1977. 1 fig, 1 tab, 7 ref.

Descriptors: *Industrial wastes, *Legislation, *Taxes, *Costs, *Sewerage, Flow measurement, Biochemical oxygen demand, Chemical oxygen demand, Sewers, Waste water treatment.

Various topics related to a series of guidelines recommended for controlling and charging for industrial effluents in England are discussed. Major objectives of the document are summarized and measures which the industrial discharger should take to comply with the objectives are discussed. Various aspects of the assessment of waste water treatment costs to industrial dischargers are discussed, including flow measurement as a basis for treatment charges, and the advantages and disadvantages of the use of COD instead of BOD as a means of determining industrial waste strength. A formula for calculating the total charge per cubic meter of industrial effluent with respect to conveyance charge, primary treatment costs, COD, suspended solids, and sludge treatment and disposal costs is presented. The use of a minimum charge to cover administrative costs for small or weak discharges is discussed. Analytical techniques and sampling schemes used in the assessment of industrial effluents are discussed. (Schulz-FIRL)
W78-03217

WATER REUSE IN THE SOUTHWEST,
New Mexico State Univ., University Park.
H. G. Folster, and W. Barkley.
AIChE Symposium Series, Vol. 73, No. 166, p 283-292, 1977. 20 fig, 5 tab, 26 ref.

Descriptors: *Water reuse, *Water resources development, *Return flow, *Southwest US, Agriculture, Water rights, Water requirements,

Tertiary treatment, Industrial water, Treatment facilities, Water utilization, Economics, Industrial wastes, Waste water treatment.

The reuse of municipal waste water to supplement limited water resources is described for the semi-arid southwesten portion of the United States which encompasses West Texas, New Mexico, and Arizona. Strict water rights and surface water allocations have limited water resources available to new users. Agricultural and industrial uses of water in the Southwest are described. Although water resources are limited, and the majority of municipal and industrial reusers of waste water in the United States are located in the southwestern portion of the country, water conservation is not practices to a great extent in the Southwest. Waste water reuse practices are described for each of the states in the region. Municipal waste water from Amarillo, Texas, is being used by the Southwestern Public Service Company for its steam-powered electrical generating plants and by Texaco for cooling and boiler water make-up. The El Paso Products Company in Odessa, Texas, uses 5.5 mgd of treated municipal effluent in its chemical manufacturing operations. Cosden Oil and Chemical Company of Big Springs, Texas, reuses municipal effluent in low-pressure boiler feed make-up water. Treated municipal waste water is being reused in New Mexico for mineral processing, cooling water, irrigation, and operations at the Los Alamos Scientific Laboratory. (Schulz-FIRL)
W78-03219

GRANULAR MEDIA FILTRATION SAVES TREATMENT COSTS; HELPS MEET EPA STANDARDS,
For primary bibliographic entry see Field 5D.
W78-03224

DREDGING OPERATIONS IN THE GALVESTON DISTRICT,
Army Engineer District, Galveston, TX.
D. S. McCoy.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 54-81, December 1976. 15 fig, 4 tab.

Descriptors: *Dredging, *Texas, *Navigable waters, *Operation and maintenance, Navigation, Channels, Costs, Transportation, Inland waterways, Annual costs, Maintenance costs, Unit costs, *Galveston(Tex), Waterborne commerce.

Discussed were dredging operations as related to the principal Federal channels constructed along the Texas Coast, commerce, dredging costs, and implications that environmental regulations and archeological problems are having on dredging. The Galveston District is responsible for the Federal navigation system in Texas, which totals approximately 1,000 miles of dredged shallow-draft and deep-draft channels ranging in depths from 6 to 45 feet. These navigation channels serve a wide variety of users ranging from recreational to sports and commercial fishermen, and industry. The major waterway users in Texas are the petroleum and petroleum-refining industries, which account for approximately 60% cf all waterborne commerce in Texas. These industries pay over $700 million in wages and ship goods valued at over $9 billion each year. In July 1975, the Corps of Engineers new Federal Dredging Regulation was published in the Federal Register. The intent of these regulations was to insure compliance with requirements of the National Environmental Policy Act of 1969 (NEPA) on all Federal projects. The new regulation significantly increases the time, cost, and the administrative work required to obtain the necessary coordination and concurrence of each disposal plan. The impact of implementing dredging regulations, complying with NEPA and adjusting to concerned environmental groups, have caused revisions of disposal procedures which have resulted in maintenance dredging costs. Reported costs jumped 37% between Fiscal Year 1974 and Fiscal Year 1975, with escalation to 86% between Fiscal Year 1975 and Fiscal Year 1976. (See also W77-09325) (Humphreys-ISWS)
W78-03229

DREDGE MATERIAL CONTAINMENT IN NYLON BAGS IN THE CONSTRUCTION OF MINI-PROJECTS FOR BEACH STABILIZATION,
North Carolina State Univ. at Raleigh. Dept. of Civil Engineering.
J. L. Machemehl.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 82-122, December 1976. 78 fig, 3 tab, 7 ref.

Descriptors: *Beach erosion, *Shore protection, *North Carolina, *On-site investigations, Beaches, Erosion control, Shape, Profiles, Barrier islands, Coasts, Data collections, On-site data collections, Projects, Groins(Structures), Hydraulic structures, Littoral drift, Inlets(Waterways), Materials, *Holden Beach(NC), Nylon bags.

Erosion in the vicinity of Lockwoods Folly Inlet, North Carolina, has been serious. Between 1943 and 1972 a high rate of shoreline erosion existed along the easternmost 6,000 ft (1829 m) of Holden Beach. Erosion occurred at an inordinate and rather steady rate of 14.7 ft/yr. Valuable ocean-front lots were lost, beach cottages were damaged, and sections of North Carolina Highway 132 were destroyed as a result of the erosion. The beach is approximately 44,000 ft long and has an average width of 1600 ft. An experimental sand-filled nylon bag groin field was planned, designed, and constructed to provide positive erosion control. A low impermeable structure with two nylon bags in the base and one nylon bag interlocking on the top was designed to stabilize the beach. The pilot groin was designed to follow the natural slop of the beach from Elev. + 5.0 ft (2.0 ft above high tide) to Elev. -3.0 ft (1.0 ft below low tide). This design allowed sand to pass over the top of the structure at high tide thus preventing excessive scour on the downdrift side. The groins were beneficial in stabilizing dredged material. Nylon bags can be used to construct inexpensive groins to stabilize a beach strand. With an economic life of two years, the bags compare favorably with other types of construction material. (See also W77-09325) (Humphreys-ISWS)
W78-03230

THE NATIONAL DREDGING STUDY,
Office of the Chief of Engineers (Army), Washington, DC.
W. R. Murden.
In: Proceedings of the Eighth Dredging Seminar; Held November 8, 1975, Houston, Texas. Sea Grant Report No. CDS-195, TAMU-SG-77-102, Texas A and M University, College Station, p 127-178, December 1976. 22 fig.

Descriptors: *Dredging, *Programs, *Forecasting, *Data collections, Surveys, Planning, Federal government, Industries, Local governments, Equipment, Navigation, Project purposes, Operation and maintenance, Annual costs, Costs.

Results from the National Dredging Study of dredging requirements were summarized and included: (1) A detailed review and analysis of the Federal dredging program during 1964-1973; including the utilization of Corps equipment and industry equipment and the division of the annual workload between industry and the Corps. (2) A detailed forecast of the national dredging requirements, both the Corps dredging program and private work, for 1974-1983; considering the impact of changed requirements, the methods and equipment that might be used, and the various alternatives of sub-dividing the dredging workload of the Corps. (3) A detailed review and analysis of the Corps bidding and estimating procedures, and an analysis of the effect of the Corps policies and procedures on the dredging operations. (See also W77-09325) (Humphreys-ISWS)
W78-03231

MODELING OF OIL EVAPORATION IN AQUEOUS ENVIRONMENT,
Technische Univ., Brunswick (West Germany). Leichtweiss Inst. for Water Research.
For primary bibliographic entry see Field 2D.
W78-03244

SELECTED ASPECTS OF THE CONTROL OF TOXIC SUBSTANCES (A COMPILATION OF SPEECHES), BY THE MEMBERS OF THE STAFF OF THE OFFICE OF TOXIC SUBSTANCES.
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 417, Price codes: A07 in paper copy, A01 in microfiche. Report No. EPA 560/4-76-002, May 1976. 147 p, 1 fig, 8 tab, 62 ref.

Descriptors: *Toxicity, *Water pollution, *Water pollution control, *Risks, Air pollution, Pesticides, Chemicals, Chlorination, Cost-benefit analysis, Microenvironment, Wastes, Chemical analysis, *Toxic Substances Control Act, *Hazard assessment, Flame retardants, Carcinogens, Mutagens.

A collection of speeches presented primarily during 1975 and 1976 by members of the staff of the Office of Toxic Substances, U.S. Environmental Protection Agency, exemplifies the evolution of interests, policies, and programs of the office. Subject areas include pesticides, flame retardant chemicals, water chlorination, mutagenic assay, chemical use in printing operations, monitoring activities, microcosm methodology, cost/benefit considerations, chemical use in well drilling operations, risk analysis for chemical carcinogens, chemical use in rubber processing operations, trace contaminants, toxic chemicals registries, and regulation and control of toxic substances. Particular attention was given to aspects of water pollution by toxic substances via industrial routes, e.g., polychlorinated biphenyls. The need to establish standards for toxic substances and contaminants was reiterated in speeches describing provisions of the pending Toxic Substance Control Act. Various indicators and tests of chemical toxicity were also reported, such as carcinogenecity and mutagenicity. (Wares-IPA)
W78-03263

SURVEY OF EQUIPMENT AND TECHNIQUES TO IDENTIFY AND QUANTIFY DISCHARGED HAZARDOUS CHEMICALS,
Battelle Columbus Lab., OH.
For primary bibliographic entry see Field 5A.
W78-03266

PRE-SCREENING FOR ENVIRONMENTAL HAZARDS--A SYSTEM FOR SELECTING AND PRIORITIZING CHEMICALS.
Little (Arthur D.), Inc., Cambridge, MA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 093, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-560/1-77-002, ADL 78486, Phase I Report, April 1977. 126 p, 13 fig, 15 tab, 10 ref, 4 append. 2 LA 328, 68-01-3208.

Descriptors: Pollutants, *Environmental effects, *Hazards, *Statistical methods, *Model studies, Chemicals, Priorities, Estimating, Forecasting, *Screening, *Hazard assessment.

Results of a study to develop a conceptual scheme for ranking chemicals emitted into the environment in order of their hazard potential are reported, with major focus on preliminary screening of chemicals prior to full commercial production and secondary focus on evaluating potential hazard of chemicals already in production. A number of alternatives for ranking chemicals were explored. The method recommended consists of selecting chemicals for further attention by comparing the concentration of each chemical that may be expected in the environment to the concentration levels of that chemical which are of concern. The proposed method for estimating the eventual environment level is based on a multicompartment model of the environment. In order to provide estimates with moderate effort, the model is substantially simplified, ensuring that the model does not underestimate eventual levels and that overestimation is kept within reasonable bounds. The proposed method for estimating levels of concern was selected on the basis of simplicity and accuracy, and a test using available information on tolerable air concentrations indicates that the estimated levels would be adequate for preliminary screening. The method also provieds the capability of ranking selected chemicals into more refined priorities by estimating the time horizon during which regulatory action would prevent significant deleterious effects. Since additioal research is required before the conceptual ranking scheme can be implemented, the development of improved methods of predicting levels of concern from available information on chemical composition is being investigated. The performance of the system with a number of test chemicals also needs investigation to validate its accuracy and efficiency. The four appendices contain descriptions of the distribution of a pollutant in the environment, chemical classes with potential for causing biological damage, estimation of diffusivities, and sample compound data. (Wares-IPA)
W78-03267

NONPOINT SOURCE CONTROL GUIDANCE CONSTRUCTION ACTIVITIES,
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
R. E. Thronson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 775, Price codes: A06 in paper copy, A01 in microfiche. Report No. EPA-700/01 Final Report, December 1976. 122 p, 27 fig, 8 tab, 123 ref, 1 append.

Descriptors: *Water pollution control, *Water pollution sources, *Construction, Water pollution effects, Erosion, Sediments, Oil, Biology, Pesticides, Metals, Soil contamination, Land development, Transportation, Communication, *Management practices.

A control guidance document is one of a series designed to provide State and areawide agencies, Federal agencies, and others concerned with information assistance in carrying out water quality planning and implementation activities with regard to nonpoint source pollution in construction activities. Information is given on identification and assessment of existing construction nonpoint source problems, analysis and procedures needed for selection of controls, descriptions of individuals and systems representing prime management practices with a method for determining their effectiveness, and several methods for predicting potential pollution problems for future construction activities. Existing data indicate that construction activities, when soils and foundation materials are disturbed and left exposed to erosion by rain, wind, and runoff water, are responsible for causing environmental damages especially to waterways, lakes, and impoundments. The best management practice for construction pollutant control is to eliminate potential pollutants at the site area, emphasizing prevention rather than treatment. Pollutants of concern include excessive sediment, chemical petroleum products, biological materials, pesticides, metals, soil additives, and miscellaneous wastes. The appendix is a summarized guidance statement on best management practices for identifying and preventing water pollution for construction nonpoint sources such as land development, transportation and communication networks, water resource facilities, and building and faciltiy construction. (Wares-IPA)
W78-03268

GEOGRAPHIC AREAS OF PARTICULAR CONCERN.
Delaware Coastal Zone Management Program, Dover.
For primary bibliographic entry see Field 2L.
W78-03273

GELATION OF OIL SLICKS BY AMINE CARBAMATES AS AN ADJUNCT TO U.S. NAVY OIL SPILL RECOVERY OPERATIONS,
Lowell Univ., MA. Dept. of Chemistry.
W. W. Bannister.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 702, Price codes: A05 in paper copy, A01 in microfiche. Final Report of Office of Naval Research for the Period 15 October 1975 - 14 November 1976, January 1977. 77 p, 20 fig. ONR-N00014-76-C-0340.

Descriptors: *Oil spills, *Water pollution control, *Pollution abatement, *Toxicity, Water quality control, Skimming, Oil pollution, *Aliphatic amines, *Amine carbamates, Carbamate salts, Recovery operations, Oil slick removal, Gelation.

Solutions of Amine D (dehydroabietylamine: 70%) in ethyl and benzyl alcohol, when sprayed on oil slicks to a concentration of about 10% and then treated with C02 to form the carbamate, provides excellent gelation of the oil. Lab tests were performed on gel strengths, effects of film thickness, temperature, and salinity for various fuels. A field test indicated that this system is very advantageous in recovery of oil slicks, in terms of ease of pick-up; immobilization of the oil; keeping the gelled oil from drifting back over cleared areas; and greater viability of the gelled slick. The toxicity of the Amine D is of a very low order, comparable to that of the oil slick itself; for water depths of over two feet, the toxicity is negligible. There is a significant (ca. 50%) reduction in evaporation rate of gelled, compared with ungelled hydrocarbons. This factor would be important in terms of reduced vapor hazards and perhaps fire hazards. Ultraviolet fluorescers as additives to the gelling agent or to the oil slick itself were studied and found to have promise in terms of providing increased visibiltiy for night time operations. (Sinha-OEIS)
W78-03276

SPORT FISHING IN WESTERN DELAWARE BAY: ASSESSMENT OF CRITICAL AREAS (RESEARCH ON THE EFFECTS OF CRUDE OIL TRANSFER AND UPSTREAM REFINERIES ON DELAWARE BAY),
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5C.
W78-03277

A PRELIMINARY TEST OF A GOVERNMENT-OWNED LOCAL AREA OIL ON WATER SURVEILLANCE SYSTEM,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5A.
W78-03281

MARKING THE SEA SURFACE WITH ARTIFICIAL SEA SLICKS AND FLUORESCENT DYES TO AID SEARCH AND RESCUE OR OCEAN DUMPING SURVEILLANCE OPERATIONS,
Naval Research Lab, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-03282

ULTIMATE DISPOSAL OF OIL AND HAZARDOUS MATERIALS,
Coast Guard Office of Research and Development, Groton, CT.
For primary bibliographic entry see Field 5E.
W78-03283

UNIQUE ECOLOGICAL FEATURES OF THE LOUISIANA COAST.
Burk and Associates, Inc., New Orleans, LA.
For primary bibliographic entry see Field 6G.
W78-03284

THE PHYSICAL OCEANOGRAPHY AND WATER QUALITY OF NEW YORK HARBOR AND WESTERN LONG ISLAND SOUND,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-03286

EXPERIMENTAL BOILER PROMOTES DEVELOPMENT OF FUEL-SAVING WATER TREATMENT PROGRAMS.
Canadian Pulp and Paper Industry, Vol 30, No 7, p 71, May 5, 1977. 1 fig.

Descriptors: *Boiler feed water, *Water treatment, *Chemicals, Industrial water, Scaling, Boilers, Laboratory tests, Water quality control, Equipment.

An experimental boiler developed by Mogul Corp. (Chagrin Falls, Ohio) is used to study deposit adhesion as afected by different chemicals used in the treatment of feed water. The boiler serves as a final evaluation tool for the testing of promising chemical treatment formulations, such as scale inhibitors, prior to the field trial stage and the introduction of new products in the market place. (Swichtenberg-IPC)
W78-03294

SPECIFIC ENERGY CONSUMPTION FOR ENVIRONMENTAL PROTECTION IN THE (SWEDISH) PULP AND PAPER INDUSTRY: QUESTIONNAIRE RESULT (SPECIFIK ENERGIFORBRUKNING FOR MILJOVARD INOM MASSA-OCHPAPPERSINDUSTRIN: RESULTAT AV EN ENKAT),
IVL-Konsult A. B., Stockholm (Sweden).
L. Sodersten, and L. Widell.
Svensk Papperstidning, Vol. 80, No. 12, p 361-362, September 10, 1977. 2 tab. English summary.

Descriptors: *Energy, *Pulp and paper industry, *Water pollution control, *Air pollution, Environment, Protection, Wastes, Industrial wastes, Waste water treatment, Foreign countries, Europe, Steam, Electric power, Activated sludge, Ecology, Biological treatment, Effluents, Sludge treatment, Pumping, Pumps, Water pollution treatment, Water pollution sources, *Sweden, Sulfite mills, Kraft mills, Paper mills, Black liquors, Condensates, White liquor(Kraft process), Fans.

This survey of 5 kraft, 5 sulfite, and 2 paper mills (conducted in the fall of 1976 by the Swedish Forest Industries Water and Air Pollution Research Foundation) led to the following indicative results: Sulfite mills consumed ca. 1500 MJ/ton(90) of steam merely to evaporate the excess water needed for better washing. In kraft mills, this effort at improved washing and black liquor collection consumed ca. 1000 MJ/ton(90) plus 500 MJ/ton(90) for condensate treatment.

Electrical energy (mainly for driving pulps and fans) amounted to 10-30 kw-hr/ton(90). Flue gas treatment requirements varied with the process used: In kraft mills 6-10 kw-hr/ton was consumed mainly for electrostatic dust precipitation; in sulfite mills, the scrubber system consumed the major amount (20-40 kw-hr/ton) of electric energy. External treatments (fiber sedimentation basins and activated sludge process) consumed ca. 5-10 kw-hr/ton(90). Thus, total electric energy demands for environmental protection came to ca. 30 kw-hr for kraft and 60 kw-hr for sulfite mills per ton of pulp. Paper mills required only electric power (no steam) for ecology treatments, viz., ca. 25 kw-hr/ton(90), of which ca. 10 kw-hr went for biological effluent treatment, 8 kw-hr for sludge treatment, and the rest (7 kw-hr) for pumping the white liquor. (Brown-IPC)
W78-03315

ENVIRONMENTAL PROTECTION ENERGY USE IN THE (U.S.) PULP AND PAPER INDUSTRY,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. O. Blosser.
Tappi, Vol. 60, No. 8, p 83-84, August, 1977. 4 tab.

Descriptors: *Water pollution control, *Air pollution, *Pulp and paper industry, *Energy, Electric power, Steam, Fuels, Burning, Sludge, Sulfite liquors, Oxidation, Evaporation, United States, Black liquors.

A NCASI environmental protection study examined the users of electrical energy for water and air quality protection, and the uses of supplemental energy (viz., steam or fuel) for burning sludge and sulfite liquors, black liquor oxidation, and dilute spent liquor evaporation. Energy needed for environmental protection in the U.S. pulp and paper industry in 1975 was 41.2 billion Btu/day. (Swichtenberg-IPC)
W78-03318

THE COMING WATER FAMINE,
House, Washington, DC.
For primary bibliographic entry see Field 3B.
W78-03324

POLLUTION AND INDUSTRIAL WASTE.
Practicing Law Institute, New York, 1970. 514 p, 1 tab. Edited by B. Handschau, J. McCord, and H. W. Enberg, II.

Descriptors: *Industrial wastes, *Water quality, *Pollution abatement, *Air pollution, *Solid wastes, Ohio, Pennsylvania, New York, Administration, Administrative agencies, Clean Air Act, Water pollution, Economics, Effluents, Federal government, Interstate commissions, Legislation, Permits, Governmental interrelations, Waste disposal, Water pollution control, Water quality standards, Water quality control, Financing, Federal Water Pollution Control Act.

The pollution of the environment by industrial wastes was the subject of a program in New York during February of 1970. This work is a transcript of that program with some expansion and revision by contributors. The problem is examined from legal, administrative, economic and political perspectives. The first chapter delves deeply into the problem of water quality management. Water quality standards are discussed along with administrative tools for implementation and enforcement. Two chapters are devoted to solid waste disposal and air pollution control. One section covers the financing of pollution abatement in Ohio with emphasis on municipal bonds. Tort liability and administrative controls, with emphasis upon problems of litigation, are discussed in another section. The final chapters consider federal involvement in pollution control from the point of view of the executive and legislative branches. Appendices include the text of the Water Quality Improvement Act of 1969 and several articles on air and industrial pollution. (Quarles-Florida)
W78-03325

DEATH OF THE SWEET WATERS,
D. E. Carr.
W.W. Norton and Company, Inc., New York, 1977. 257 p.

Descriptors: *Water management(Applied), *Water pollution, *Desalinization, *Potable water, Water law, Weather, Sewage, Sea water, Precipitation(Atmospheric), Powerplants, Potomac River, Oil industry, Pulp and paper industry, Mississippi River, Hudson River, Groundwater, Great Lakes, Geological surveys, Flood control, Droughts, Detergents, Cloud seeding, Thermal pollution, Irrigation.

The world is rapidly approaching a water crisis of mammoth proportions. Causes of the shortage of clean water are examined with heavy emphasis is placed on the problems of the United States. The author discusses various aspects of the problem including detergent pollution, industrial wastes, sewage, drought, floods, saline water intrusion, and silting. The control of water is viewed from an historical perspective. One chapter is devoted solely to the study of the physical properties of water. Another summarizes legal issues in the area of water rights. The problem of man's lack of knowledge about the effects of many water pollutants is discussed. Among the solutions that the author suggests are desalination and weather modification. He concludes that the major problem in the water field is pollution since there is a shortage of clean water. Although federal programs are needed to accomplish anything of lasting importance, the author criticizes scattered federal research grants distributed under the Water Resources Research Act. He urges the use of a close-knit, highly professional group for research. The work includes an extensive sixteen page bibliography. (Quarles-Florida)
W78-03326

THE INDUSTRY/EPA CONFRONTATION (LIVING TODAY WITH THE WPCA AMENDMENTS OF 1972),
Centec Consultants, Inc., Reston, VA.
P. S. Minor.
McGraw-Hill Book Company, New York, 1976. 343 p, 4 tab.

Descriptors: *Water quality control, *Water pollution control, *Water pollution treatment, *Federal Water Pollution Control Act, *Industrial wastes, Pollutants, Water pollution, Water quality, Water treatment, Water pollution sources, Governments, Legislation, Water resources, Water resources development, Legal aspects, Administration, Water policy, Toxins, Wastes, Industrial water.

The Federal Water Pollution Control Act Amendments of 1972 (FWPCA) authorized by the Environmental Protection Agency (EPA) to specify levels for national guidelines in pollution control and to require stringent policies of control to meet water quality requirements. The author feels that the EPA has abused its power in seeking enforcement of poorly planned and unrealistic control policies that could waste national resources and impose unncessary expense on industry. The presentation is designed to assist the manager in an industrial water pollution control setting to comply with the FWPCA in a cost-practical way. Discussion of the law focuses on control of industrial point sources. Materials include the FWPCA provisions and discussion and background of past conflicts between the EPA and industry on technical, economic and legal issues. Other topics include obtaining permits, improvements in technology, and factors influencing the future government controls on industry. Appendices offer information on: (1) national litigation; (2) implementation of guidelines in other areas of the FWPCA such as toxic materials, inspection and monitoring and municipal treatment plants; (3) the National Commission on water quality; and (4) an EPA organizational chart. (Mulligan-Florida)
W78-03327

ECONOMIC ANALYSIS OF INDUSTRIAL INCENTIVES FOR POLLUTION CONTROL: IMPLICATIONS FOR WATER QUALITY.
ABT Associates, Inc., Cambridge, MA.
Prepared for Federal Water Pollution Control Administration, Washington, D.C., December, 1967. 119 p, 2 tab.

Descriptors: *Industries, *Pollution abatement, *Industrial wastes, *Water pollution control, River basin commissions, Regional development, Research and development, Effluents, Waste treatment, Wastes, Benefits, Water resources development, Sanitary engineering, Sewage treatment, Domestic wastes, Streams, Federal government, River basin development, Technology, Hydrology, Water quality, Water pollution, Economics, Economic impact.

In an effort to hasten the abatement of water pollution, the federal government set standards that industry must meet in the handling of industrial wastes. In order to encourage industry to comply more swiftly with the standards, the government has used various incentive programs. This report explores and ultimately rejects these general incentives as being unlikely to affect the amount of pollution control investment undertaken. The writers suggest that such incentives will raise the cost of society by promoting inefficiency. The report sets forth, as a major solution, regional or river basin water quality authorities. These would assume much of the responsibility for waste treatment and water quality. By changing the focus of the nation's pollution control efforts, abatement for water pollution may be achieved in an efficient and equitable manner. Industrial leaders will be inclined to cooperate because of the cost savings to them as a result of the relief of the burden of building and operating pollution control facilities. The report includes a list of specific recommendations concerning fiscal incentives, river basin authorities, current problems, hardship cases, and scarce inputs to pollution control. (Quarles-Florida)
W78-03328

WATER QUALITY MANAGEMENT PLANNING: THE FATE OF 208,
Cook Coll., New Brunswick, NJ. Environmental Law.
W. Goldfarb.
Toledo Law Review, Vol. 8, No. 1, p. 105-34, Fall 1976.

Descriptors: *Land use, *Federal Water Pollution Control Act, *Water quality control, *Water management(Applied), Water law, Legal aspects, Alternate planning, Comprehensive planning, Planning, Water policy, Water resources, Water conservation, Water pollution sources, Water pollution, Aquatic environment, Environmental control, Wastes, Water quality, Law enforcement, Penalties(Legal).

The water quality management planning mechanism of the Federal Water Pollution Control Act (FWPCA) may be ineffective as a vehicle for reconciling land use and management with water quality considerations. This defect is ascribed to the inadequate enforcement devices attendant to FWPCA. Section 208 of FWPCA purports to require each state to develop areawide plans for managing all wastes generated in the area. FWPCA does not, however, contain provisions which would compel the development of these plans; the only sanctions contained in section 208 apply exclusively after the plans have been ap-

proved by the Regional Administrator of the Environmental Protection Agency. Although the FWPCA has been judicially interpreted as requiring 208 plans, the courts have not imposed any sanctions for failure to produce a plan. Several enforcement alternatives including witholding of pollution control funds, and writs of mandamus are discussed and rejected as inadequate or counterproductive. The author concludes that the very unenforceability of water quality management planning will result in the passage of stronger state and federal land use laws. (Brightman-Florida)
W78-03330

EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE FOR NEW SOURCES.
National Field Investigations Center-Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 300, Price codes: A07 in paper copy, A01 in microfiche.
August, 1974, 124 p.

Descriptors: *Regulation, *Effluents, *Water pollution abatement, *Industrial wastes, Administrative agencies, Federal government, Grains(Crops), Water pollution sources, Canneries, Sugar crops, Textiles, Cements, Chemical industry, Plastics, Detergents, Fertilizers, Wood wastes, Oil industry, Metals, Electric power industry, Asbestos, Rubber, Feed lots, Pulp and paper industry.

The Environmental Protection Agency has compiled a set of tables of effluent limitations for industrial wastes classified by industries and time units. Interim guidelines to be achieved by July 1977 and final guidelines to be achieved by July 1983 are included. The effluent reduction to be achieved by new sources is also listed in the tables. The industries covered are dairy products processing; grain mills; canned and preserved fruits and vegetables processing; canned and preserved seafood processing; textiles; sugar processing; cement manufacturing; feedlots; electroplating; organic chemicals; inorganic chemicals; plastics and synthetics; soap and detergents; fertilizer manufacturing; petroleum refining; iron and steel manufacturing; non-ferrous metals; phosphate manufacturing; steam electric power generating equipment; ferroalloy manufacturing, leather tanning and finishing; glass manufacturing; asbestos manufacturing; rubber processing; timber products; pulp, paper and paperboard; builders paper and board; and meat products. (Moorehouse-Florida)
W78-03331

EFFECTIVE NATIONAL REGULATION OF POINT SOURCES UNDER THE 1972 FEDERAL WATER POLLUTION CONTROL ACT: THE DOUBLE BURDEN OF LEGISLATIVE DRAFTMANSHIP AND JUDICIAL REVIEW,
J. Jackson.
Georgia Law Review, Vol 10, No 4, p 983-1024, Summer 1976.

Descriptors: *Federal jurisdiction, *Water pollution control, *Legislation, *Regulation, *Legal review, State jurisdiction, Legal aspects, Water quality control, Effluents, Discharge(Water), Penalties(Legal), Sewage effluents, Economic feasibility, Technology, Water law, Administrative agencies, Federal Water Pollution Control Act, Judicial decisions, Administrative decisions, Law enforcement.

Because of poor draftsmanship, conflicting judicial decisions have hampered administration of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA). Although the FWPCA urged federal and state cooperation in discharge regulation, it was unclear which level of government had final responsibility. Frequently the Environmental Protection Agency (EPA) has had to assume control when states concerned about attracting industrial development were lax in enforcing effluent limitations of point sources. As a result the EPA regulations were often directed at a single polluter and much litigation arose. Under both the FWPCA and the Aministrative Proceddures Act, the Federal district court had jurisdiction to review EPA guidelines. Section 509 of the FWPCA granted jurisdiction to the Circuit Courts of Appeals to review EPA effluent limitations. Needless litigation to determine whether EPA regulations were guidelines or effluent limitations threatened the administration of the FWPCA. The author urges the courts to ignore the superficial issue of jurisdiction and to determine state responsibility for enforcing the FWPCA. (Cocheu-Florida)
W78-03333

LIABILITY, COMPENSATION AND PREVENTION OF OIL SPILLS: A NORTH AMERICAN PERSPECTIVE,
Lewis and Clark Co., Portland, OR. Northwestern School of Law.
J. L. Pedrick.
Earth Law Journal, Vol 1, No 4, p 301-22, November 1975.

Descriptors: *Compensation, *Insurance, *Oil spills, *Oil pollution, Protection, Law of the Sea, Regulation, Legislation, International law, Oil industry, Oil, Florida, Water pollution, Water law, Legal aspects, Coast Guard regulations, International waters, Water pollution sources, Disasters, Water quality control, Coasts.

International conventions and United States statutes provide limits to liability for oil spills which are too low to cover the clean-up costs of spills from today's oil supertankers. The 1971 International Maritime Consultative Organization Compensation Convention sets a fairly adequate $30 million limit but too narrowly restricts the situations which are covered. Increasing liability limits to adequate levels covering a broad range of situations may increase insurance premiums to a prohibitive levels. Supplemental insurance subsidized by interested countries or chartering oil companies may help finance the increase in cost of insurance. Coastal states in the United States may now pass laws similar to Florida's 1970 Oil Spill Prevention and Pollution Control Act because the Supreme Court has held that states may be indemnified by potential pollutors. Improved tanker construction and port traffic control are also necessary to prevent oil pollution but international acts in these areas have received little support. Absent this support, unilateral actions like the Coast Guard Regulations for tank vessels in domestic trade may set precedent for industrialized nations interested in protecting at least their own coasts. An extensive list of references is found in the footnotes. (Hammersley-Florida)
W78-03335

THE UNITED NATIONS ENVIRONMENT PROGRAM: THE MEDITERRANEAN CONFERENCES,
For primary bibliographic entry see Field 6E.
W78-03336

ENVIRONMENTAL REGULATION OF OFFSHORE EXPLORATION, PRODUCTION, AND DEVELOPMENT,
Atlantic Richfield Company, Anchorage, AK.
C. D. Cowles, IV.
In: Environmental Regulation of Offshore Exploration, Production, and Development: Proceedings of the 27th Annual Institute on Oil and Gas Law and Taxation, February 18-20, 1976, Dallas, Texas, Mathew Bender, New York, 1976, p. 53-96.

Descriptors: *Oil industry, *Exploration, *Offshore platforms, *Regulation, *Permits, Drilling, Legislation, Effluents, Oil pollution, Economic impact, Federal jurisdiction, Administrative agencies, Leases, State jurisdiction, Federal Water Pollution Control Act, Geologic investigations, Oceans, Oil fields, Legal aspects, Environmental control.

Since statutory and regulatory time periods for various reports and permits from government agencies can delay the development of offshore oil fields, the oil industry must be prepared early in its planning stages to encounter a myriad of administrative procedures. Under the Outer Continental Shelf Lands Act, the oil industry must obtain permits to begin geological and geophysical exploration. Then compliance with provisions regulating pollution and waste disposal is required. If offshore leases have been issued, exploratory drilling permits must be obtained for various types of drilling procedures. Pollutant discharge at this stage is regulated by the Federal Water Pollution Control Act Amendments of 1972. Dischargers must obtain a permit under the National Pollutant Discharge Elimination System. A separate ocean dumping permit is required to discharge drilling mud and cement. The Environmental Protection Agency must then approve a spill prevention control and countermeasures plan. Often onshore development near new drilling cites requires compliance with federal and state coastal zone management acts. Finally an environmental impact statement under the National Environmental Policy Act may have to be issued if any significant federal action is involved in offshore development. (Cocheu-Florida)
W78-03337

ENVIRONMENTAL PROBLEMS ONSHORE,
Shell Oil Co., Houston, TX. Corporate Law Dept.
J. A. Evans.
In: Environmental Problems Onshore: Proceedings of the 27th Annual Institute on Oil and Gas Law and Taxation, February 18-20, 1976, Dallas, Texas, Matthew Bender, New York, 1976, p. 29-51.

Descriptors: *Oil industry, *Legislation, *Regulation, *Federal jurisdiction, *Water pollution control, Administrative agencies, Political constraints, Clean Air Act, Potable water, State jurisdiction, Permits, State governments, Federal Water Pollution Control Act, Navigable waters, Industrial wastes, Economic impact, Federal government, Effluents, Aquifers, Legal aspects.

Recent environmental laws have produced significant problems for the oil and gas industry. To comply with the National Environmental Policy Act, industry had to await environmental impact statements from federal agencies. Administrative delay held up progress on the Alaska pipeline for three years and slowed coal and other energy resource development. Stringent air quality standards and regulations promulgated under the Clean Air Act hindered industrial growth and development. Language ambiguities in the effluent limitations and guidelines of the Federal Water Pollution Control Act (FWPCA) have caused extensive litigation by industries unable to determine how to comply. The FWPCA also established the National Pollutant Discharge Elimination System which requires a permit be obtained for discharge of pollutants. The Safe Drinking Water Act authorized regulation of underground injection of brine for oil and gas production. In addition, state laws and regulations often hamper industrial operations. Because complex technical engineering decisions must be made to promulgate regulations and the laws, the author proposes a special environmental court. Decisions of present courts, equipped to rule on technical matters, often have costly ramifications for industry. (Cocheu-Florida)
W78-03338

ALASKA PIPELINE--FINANCIAL RESPONSIBILITY FOR OIL SPILLS.
Federal Maritime Commission, Washington, DC.
Federal Register, Vol 42, No 115, p 50584-97, June 15, 1977.

Descriptors: *Oil spills, *Alaska, *Penalties(Legal), Ships, *Law enforcement, Insurance, Pipelines, Administration, Regulation, Water, Water pollution, Administrative decisions, Oil pollution, Water pollution control, Water law, Legal aspects, Water policy, Legislation, Transportation, Damages, Water pollution sources.

The federal Maritime Commission has proposed regulations to enable vessel operators to comply with subsection (c) of section 204 of the Trans-Alaska Pipeline Authorization Act. The Act makes the owners and operators of vessels which load certain oil at the terminal facilities of the trans-Alaska pipeline jointly, severally, and strictly liable for damages resulting from the discharge of oil from such vessels. In addition, the Act requires that financial responsibility in the amount of $14 million be demonstrated before any oil is loaded. The proposed regulations would allow certificates of financial responsibility to be issued to vessel owners demonstrating their financial responsibility. Besides the issuance of certificates, the proposed regulations discuss procedure for demonstrating financial responsibility fees for issuance of the certificates, and enforcement of the rules by the U.S. Coast Guard. Also included are samples of the forms to be used to establish the shipowner's financial responsbility. (Stadler-Florida)
W78-03340

OIL POLLUTION LIABILITY LEGISLATION TRANSMITTED TO THE CONGRESS,
G. Ford.
Department of State Bulletin, Vol 73, p 262-63, August 18, 1975.

Descriptors: *Legislation, *Oil pollution, *Oil spills, *Compensation, Protection, Coasts, Environmental effects, Water pollution, Oil industry, International waters, Water pollution sources, Transportation, Boats, International law, Treaties, Damages, Environment, Federal jurisdiction, State jurisdiction, Navigable waters.

In his message to Congress regarding his proposed Comprehensive Oil Pollution Liability and Compensation Act of 1975, President Ford outlined the deficiencies in the present manner of dealing with oil spills, the main features of the bill that would mitigate those problems, and the bill's importance to the international effort to protect the marine environment. Available data showed that one third of all oil spills were uncompensated because their sources were unidentifiable; furthermore, inconsistent Federal and state laws hampered the compensation process. This legislation would (1) establish strict liability for all oil pollution damages from identifiable sources; (2) provide relief for oil-related environmental damages; (3) establish a uniform system for settling claims; and (4) provide for compensation for spills from unidentifiable sources. The bill would be funded by placing a small fee on oil transported or stored on or near navigable waters. In addition, the bill would implement two international conventions which provide remedies for oil pollution damage from ships at sea. These remedies apply to ships not otherwise subject to American laws and courts which discharge oil that reaches this country's shores. (Jones-Florida)
W78-03343

PETROLEUM REFINING POINT SOURCE CATEGORY PRETREATMENT STANDARDS FOR EXISTING SOURCES EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol. 42, No. 56, p 15684-90, March 23, 1977.

Descriptors: *Federal Water Pollution Control Act, *Oil industry, *Regulation, *Effluents, Discharge(Water), Pretreatment(Water), Environment, Storm runoff, Biological treatment, Pollutants, Chromium, Phenols, Sulfides, Wastewater(Pollution), Water pollution treatment, Water pollution sources, Water pollution, Streams, Oil, Municipal water, Pollutant identification, Oil pollution, Oil wastes, Ammonia.

The Environmental Protection Agency has established interim final pretreatment standards for existing sources in the petroleum refining point source category. Two sets of pretreatment standards were established: (1) prohibited discharge standards; and (2) categorical pretreatment standards. The first set was designed to protect municipal treatment works by prohibiting the discharge of pollutants that would hinder the operation of publicly owned treatment works such as those which would cause a fire or explosion hazard or would cause corrosive structural damage. The second set contained numerical limitations on pollutants from existing sources in the petroleum refining point source category which would damage publicly owned treatment works. The regulations promulgated establish the maximum concentrations of ammonia, oil, and grease allowed to be discharged by petroleum refineries to publicly owned treatment works. Prior to the establishment of these regulations, many groups and agencies were allowed to participate in their development. The Environmental Protection Agency also conducted a study on the economic and inflationary impact of the new regulations and found it to be reasonable. (Quarles-Florida)
W78-03346

TEXTILE INDUSTRY POINT SOURCE CATEGORY EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol. 42, No. 102, p 26979-84, May 26, 1977.

Descriptors: *Industrial wastes, *Textiles, *Federal Water Pollution Control Act, *Sewage treatment, *Pre-treatment(Water), Discharge(Water), Hazards, Waste water disposal, Water pollution sources, Biological treatment, Coagulation, Waste water treatment, Pollutants, Water quality control, Industrial water, Standards, Treatment facilities, Disposal, Effluents, Sewage, Sewage effluent.

Final pretreatment standards are herein established governing existing sources in the wool scouring, wool finishing, dry processing, woven fabric finishing, knit fabric finishing, carpet mills, and stock and yarn dyeing and finishing subcategories of the textile mills point source category. Those pollutants which create a fire or explosion hazard, cause corrosive damage, obstruct sewer flow, or upset treatment efficiency are prohibited in an effort to protect publicly owned treatment plants. The economic and inflationary impact of these regulations is predicted to be minimal, and no price increases are expected as a result of these regulations. An appendix to the regulations summarizes the basis of these final pretreatment standards, and discusses various technical alternatives for compliance with the regulations. A study was made of energy requirements and nonwater quality environmental impacts of various pretreatment technologies. Comments on the regulations made by private individual and industries are included. (Brightman-Florida)
W78-03347

FINANCIAL RESPONSIBILITY FOR OIL POLLUTION, ALASKA PIPELINE.
Federal Maritime Commission, Washington, DC.
Federal Register, Vol. 42, No. 146, p. 38798-811, July 29, 1977.

Descriptors: *Pipeline, *Oil spills, *Regulations, *Transportation, *Ships, Alaska, Administrative agencies, Coast Guard regulations, Federal government, Gasoline, Insurance, Oil, Oil fields, Oil industry, Oil pollution, Piping systems(Mechanical), Water law, Water pollution, Law enforcement.

The Federal Maritime Commission has issued regulations implementing subsection (c) of section 204 of the Trans-Alaska Pipeline Authorization Act. That subsection makes the owners and operators of vessels carrying oil which has been transported through the trans-Alaska pipeline, jointly, severally, and strictly liable for damages resulting from the discharge of oil from such vessels. The subsection further requires proof of financial responsibility for $14 million before such oil may be loaded aboard a vessel. The applicant may establish its financial responsibility by filing an insurance form, a surety bond form, or by maintaining in the United States working capital and net worth of $19 million or more, depending upon the number of vessels. The regulations will be enforced by the Coast Guard. A vessel engaged in a prohibited activity may be denied entry into any port of the United States, and may be detained at any port. The regulations also set standards for certificates; procedures for application and issuance; and the grounds for denial and revocation. (Jordan-Florida)
W78-03351

WATER RESOURCE POLICY STUDY.
Water Resources Council, Washington, DC.
For primary bibliographic entry see Field 6E.
W78-03352

JUDICIAL MAELSTROM IN FEDERAL WATERS: A COMPOSITE INTERPRETATION OF THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
R. H. Jensen.
Fordham Law Review, Vol 45, No 3, p 625-50, December, 1976.

Descriptors: *Effluents, *Legislation, *Federal Water Pollution Control Act, *Judicial decisions, Legal review, Wastes, Water pollution, Legal aspects, Federal government, Administrative agencies, Permits, Regulation, Water Quality Act, Water pollution sources, Discharge(Water), Industrial wastes, Waste water(Pollution), Administrative decisions.

Framers of the Federal Water Pollution Control Act Amendments of 1972 strove to eliminate interpretive problems by clearly manifesting the intent of Congress upon the face of the Act. A survey of recent circuit court opinions, however, highlights rampant judicial confusion in interpreting the Act. One major problem concerns Environmental Protection Agency (EPA) authority to issue effluent limitations as regulations. Another issue is whether circuit courts have jurisdiction to review existing source regulations. The Eighth Circuit held that Section 301 of the Act does not grant the EPA the requiite regulatory authority; six months later, both the Third and Seventh Circuits found that Section 301 did authorize the EPA to issue effluent limitations as regulations. Later still, the Fourth and Tenth Circuits agreed with the Third and Seventh Circuits, but they did so via a different statutory track. Finally, the Second and District of Columbia Circuits support the majority position but use yeat another mode of analysis. Despite the great wealth of legal reasoning on this issue, each opinion contains pitfalls and consequently each remains unconvincing. It will be up to the Supreme Court to remedy the divergent views. (Moorhouse-Florida)
W78-03356

ONSHORE IMPACT OF OFFSHORE DRILLING: THE POLICE POWER ALTERNATIVE,
G. L. Barr.
Southwestern University Law Review, Vol. 8, No. 4, p. 967-91, 1976.

Descriptors: *Regulation, *Offshore platforms, *Zoning, *Environmental effects, *Land use, Coasts, Continental shelf, Land development, Oil industry, Drilling, Local governments, Legal aspects, Public rights, Exploitation, Water law, Oil, Oil pollution, Oil wastes, Water pollution sources, Legislation, State governments, Governmental interrelations.

The United States is currently engaged in a program to relieve domestic dependence on foreigh energy supplies through expanded development of mineral resources on the outer Continental Shelf (OCS). Although the OCS is a potential goldmine of energy resources, indiscriminate exploitation will lead to severely adverse environmental consequences. Numerous methods exist for controlling the onshore impacts of OCS operations such as coastal commissions and the environmental impact statement process. Another alternative is the use of the police power by local officials. This power enables the state to make all laws necessary to advance the health, safety, morals or general welfare of the people which do not violate the Constitution. Zoning is the foremost example of police power and is a major weapon in offsetting the effects of offshore development through conservation, aesthetics and protection from natural hazards. Municipal ordinances may also be used to offset adverse environmental consequencws if the end sought to be obtained by the ordinance is proper and the method utilized reasonable. A final avenue open to the local community is the utilization of the public nuisance doctrine to enjoin both harmful and aesthetic nuisances. (Moorhouse-Florida)
W78-03358

WATER RIGHTS IN THE COAL FIELDS OF THE YELLOWSTONE RIVER BASIN,
Bureau of Indian Affairs, (Washington, DC.).
For primary bibliographic entry see Field 6E.
W78-03359

PRETREATMENT STANDARDS FOR EXISTING SOURCES AND NEW SOURCES OF POLLUTION (PROPOSED REGULATIONS FOR 21 INDUSTRIES).
Environmental Protection Agency, Washington, DC.
Federal Register, Vol 42, No 22, p 6476-6501, February 2, 1977.

Descriptors: *Water quality standards, *Water pollution control, *Pretreatment(Water), *Industrial wastes, *Treatment facilities, Water treatment, Water pollution, Water pollution sources, Water quality control, Standards, Legal aspects, Industrial production, Industrial plants, Industrial water, Waste water treatment, Waste dilution, Waste treatment, Management, Local governments, Municipal water, Municipal wastes.

The Environmental Protection Agency has proposed rules for the establishment of pretreatment standards for existing sources and new sources of pollution involving 21 industries. The rules generally (1) provide for the prohibition of the release of pollutants which interfere with the operation of any publicly-owned treatment works; (2) require the establishment of pretreatment standards; (3) prohibit dilution to meet the standards; and (4) allow for the request of an industrial variance from the standards through a specified application procedure where the applicant must demonstrate a fundamental difference in the factors considered in establishing the standards and the applicant's effluent discharge. A variance may be granted where the established standards are thus shown to be inappropriate. In addition, the rule provide for the adoption of local rules substantially equivalent to the above, by municipalities operating their own treatment works. Provisions for special variances by local municipal plant dischargers of specific pollutants are specified. The procedure to be followed in making such applications is set forth as well. The proposed rules require the public disclosure of any information submitted or required under any of the above procedures. (Yawn-Florida)
W78-03361

THE TOWN DILEMMA (P.C.B.'S IN BLOOMINGTON, INDIANA),
D. Jordan.
Environment, Vol 19, No 2, p 6-15, March, 1977. 2 fig.

Descriptors: *Polychlorinated biphenyls, *Industrial wastes, *Indiana, *Chemical wastes, *Waste disposal, Effluents, Industrial plants, Industrial production, Water pollution, Water pollution sources, Aroclors, Sewage, Sewage sludge, Waste treatment, Solid wastes, Pesticides, Sludge, Water quality, Sewage effluents, Environmental effects, Toxins, Soil contamination effects, Water pollution effects, Industrial water.

The Westinghouse plant in Bloomington, Indiana has apparently produced economic and health problems by its use of polychlorinated biphenyls (PCB's). PCB's are to be banned entirely by 1979 under the federal Toxic Substances Control Act because of their adverse effects on human and environmental health. The Westinghouse system permits PCB's to escape in air discharges, in stormwater runoffs from outdoor plant areas, and in discharges to the city sewer system. Bloomington's interest in retaining the jobs and economic support provided by Westinghouse prevents unified opposition. Elections of last November seemed to produce public support for the Westinghouse position. Litigation continues between the company and the State of Indiana but public interest has declined and hearings were transferred to Indianapolis where testimony has been heard since November 1976. Westinghouse has attempted to join Bloomington as co-defendent in the class action suit brought by city residents. The company argued that the city's sewage effluent carried PCB's to drinking water supplies and the city's sludge brought PCB's to agricultural lands. (Mulligan-Florida)
W78-03362

STATE BOARD ADOPTS COMPREHENSIVE ACTION PLAN (WASTEWATER RECLAMATION),
D. Smith.
Western Water, p 4-6, January/February 1977.

Descriptors: *Reclaimed water, *Water reuse, *California, *Waste water treatment, Treatment facilities, Water pollution treatment, Water pollution, Water management(Applied), Water policy, Water resources, Water purification, Water quality control, Water resources development, Impaired water use, Reclamation, Water supply, Alternative water use, Water rights, Water utilization.

In January, 1977, the California State Water Resource Control Board adopted a policy encouraging wastewater reclamation and reuse of treated water. To implement that policy they will utilize the state and federal Clean Water Grant Program for funding, thus providing up to 87 1/2 percent of the cost of building treatment facilities. In addition, the Board will encourage use of reclaimed water as part of its ongoing water rights administration program. However, domestic use is not anticipated for reclaimed water. Projects that do not impair current water uses may be funded if they also: (1) make beneficial use of wastewater otherwise discharged into brackish receiving water; (2) supplement freshwater uses with reclaimed water; or (3) preserve, restore, or enhance instream beneficial uses such as fish and wildlife. Legislation may be sought to authorize Board review of water supply contracts to ensure full consideration of reclamation alternatives. The policy statement of the Board recommends further research and demonstration projects. The Association of California Water Agencies expressed support for the reclamation concept, but urged modification in areas of water rights and cost distribution. (Mulligan-Florida)
W78-03363

STATE UNDERGROUND INJECTION CONTROL PROGRAMS.
Environmental Protection Agency, Washington, DC.
Federal Register, Vol 41, No 170, p 36730-45, August 31, 1976.

Descriptors: *Water quality control, *Underground waste disposal, *Public health, *Injection wells, Waste disposal wells, Water wells, Waste storage, Rechare wells, Water quality, Potable water, Subsurface drainage, Drainage wells, Administrative agencies, Water permits, Injection, Underground structures, Regulation.

Pursuant to the Public Health Service Act, as amended by the Safe Drinking Water Act, the Environmental Protection Agency (EPA) has proposed regulations governing state underground injection control programs. The regulations establish minimum requirements for state programs to protect existing and potential underground sources of drinking water from harm from underground injection of fluids. Existing state programs are strengthened and broadened by the proposals. Three categories are created to enable regulation of diverse underground injection practices. Three categories are created to enable regulation of diverse underground injection practices. The first group includes waste disposal wells, wells used to inject materials into underground strata for storage, recharge wells, barrier wells, subsidence control wells and mining wells. The second category covers underground injection wells as they relate to oil and gas production. The third group includes drainage wells. Minimum state permit requirements applicable to wells within each of the above listed groups are set forth in detail. Requirements and procedures for the federal approval of state underground injection control programs are also specified. These regulations are based upon review by the EPA of existing state programs and on technical and policy input from diverse sources. (Josepher-Florida)
W78-03364

WATER PROGRAMS: SECONDARY TREATMENT INFORMATION (PROPOSED RULES).
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol. 41, No. 172, p 37, 222-23, September 2, 1976.

Descriptors: *Oxidation lagoons, *Waste water treatment, *Ponds, *Sewage treatment, *Sewage lagoons, Suspended solids, Federal Water Pollution Control Act, Lagoons, Regulations, Bacteria, Water quality control, Water treatment, Wastewater(Pollution), Wastes, Algae, Algal control, Sewage treatment, Settling, Basins, Ponding, Administrative agencies.

The Environmental Protection Agency (EPA) has proposed an amendment to the Secondary Treatment Information regulation promulgated pursuant to the Federal Water Pollution Control Act Amendments. The amendment provides for an upward adjustment of the suspended solids limitations in ponds which are used for secondary treatment and have a maximum capacity of one million gallons per day. This special consideration recognizes that ponds without supplemental solids

removal processes may not be capable of achieving the suspended solids requirements of the existing regulation. The EPA counsels against large scale replacement of ponds with mechanical plants because of the widespread use of ponds in small communities and because of the many benefits derived from the use of wastewater treatment ponds. Some of these benefits are: low costs of construction and operation; ease of operation; low energy requirements; and, the ability of many ponds to achieve low fecal coliform bacteria concentrations without separate disinfection processes or the use of chemical disinfectants. Variances are proposed with respect to suspended solids requirements in National Pollutant Discharge Elimination System permits for publicly-owned treatment works. (Josepher-Florida)
W78-03365

BIOCHEMICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND PH (SECONDARY TREATMENT INFORMATION).
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol. 41, No. 144, p 30786-88, July 26, 1976.

Descriptors: *Sewage treatment, *Coliforms, *Disinfection, *Federal Water Pollution Control Act, *Water quality standards, Biochemical oxygen demand, Chlorination, Treatment, Treatment facilities, Effluents, Bacteria, Water quality control, Water treatment, Water purification, Suspended solids, Chlorine, Acidity, Acid-base equilibrium, Regulation, Administrative agencies.

The Environmental Protection Agency (EPA) has amended its Secondary Treatment Information regulation, promulgated pursuant to sections 301 and 304 of the Federal Water Pollution Control Act Amendments of 1972, by deleting the fecal coliform bacteria limitations. In lieu of the deleted limitations, the EPA will henceforth rely on state water quality standards for establishment of minimum disinfection requirements for publicly owned treatment works (POTW's). Disinfection requirements will remain as conditions of permits issued under the National Pollutant Discharge Elimination System (NPDES). The EPA recognizes that continuous disinfection of all municipal wastewater discharges is not necessary to protect public health from disease. Potential effects resulting from the use of chlorine for wastewater disinfection are discussed. The value of the use of coliform bacteria and chlorine residual as microbiological indicators of wastewater contaminants is also discussed. The specification of a minimum chlorine residual as an indicator of adequate disinfection is rejected due to its process related approach and its preclusion of other disinfection processes. No changes in the amendment for pH limitation have been made. Minimum levels of effluent quality attainable by secondary treatment are described in terms of biochemical oxygen demand, suspended solids, and pH. (Josepher-Florida)
W78-03366

THE DEVELOPMENT OF THE CALIFORNIA AND FEDERAL WATER POLLUTION CONTROL PROGRAMS,
S. Cleong.
University of California, Davis, Law Review, Vol. 5, p 234-71, 1972.

Descriptors: *Coordination, *Grants, *Water quality control, *California, *Governmental interrelations, Financial feasibility, Water rights, Federal jurisdiction, Legal aspects, Regulation, State jurisdiction, Reservation doctrine, Water pollution, State governments, Financing, Costs, Capital, Participating funds, Water quality standards, Federal Water Pollution Control Act, Legislation, Standards.

The problem of federal-state interaction is prevalent in all major areas of pollution control. An analysis of the situation for controlling water pollution is relevant to other areas of pollution control as well. In the area of water pollution, Congress has held fast to the philosophy that primary responsibility for control rests with the states. However, it continues to exert influence by conditioning grants on certain prerequisites and threatening to have the Environmental Protection Agency do for the states what the states fail to do themselves. The establishment of federal water quality standards has also been successful. In California, the effect of the federal program upon California's water quality control legislation has been minimal. The area where federal activity has been most influential is the much needed federal grant program where California clearly depends on federal money. The interplay between the states and the federal government should vary according to the actual needs of the specific area of concern. Over-adherence to state responsibility can be just as damaging as an over-zealous assumption of power by Congress. (Rieck-Florida)
W78-03367

BALANCING OF INTEREST AND INTERNATIONAL LIABILITY FOR THE POLLUTION OF INTERNATIONAL WATERCOURSES: CUSTOMARY PRINCIPLES OF LAW REVISITED,
Yale Univ., New Haven, CT. Yale Law School.
G. Handl.
The Canadian Yearbook of International Law, Vol 1975, p 156-94, 1975.

Descriptors: *Water quality control, *International law, *Water pollution control, *International waters, Legal aspects, Environmental effects, Environment, Penalties(Legal), Law of the Sea, Jurisdiction, Legal review, Regulation, Water pollution, United Nations, Treaties, Law enforcement, Reasonable use.

By specifying fundamental competences and liabilities, customary international legal principles concerning transnational pollution provide the legal framework for general analysis of international environmental disputes. On the basis of case law, state practice and examined literature, it may be inferred that as a fundamental principle, state responsibility for the pollution of an international watercourse is not grounded in one uniform theoretical concept. Rather, liability for extraterritorial environmental effects is the result of a convergence of several elements. One of the primary elements is extraterritorial damage, i.e. environmental damage in the narrow sense or damage in or to the territory of another state. Another basic factor hinges on attribution of the activity causing damage to the state. Principle 21 of the Stockholm Declaration emphasizes the fact of control over the activity as an element invoking liability. Other lesser elements also considered are: (1) breach of a specific international legal obligation; (2) the specific nature of the conduct causing the pollution being a source of special danger as defined by treaty; and (3) 'unreasonable use' of the waters. In sum, a finding of state responsibility under customary international law depends on a balancing of interests, taking into account various factors pertinent to the situation under consideration. (Rieck-Florida)
W78-03368

FINAL REVISION OF REGULATIONS AND CRITERIA FOR OCEAN DUMPING.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol. 42, No. 7, p 2462-90, January 11, 1977, 29 p.

Descriptors: *Oceans, *Permits, *Disposal, *Waste disposal, Water quality control, Water policy, Regulations, Legal aspects, Legislation, Water pollution, Water quality standards, Water law, Toxicity, Water pollution effects, Bioassay, Hazards, Water pollution sources, Sites, Law enforcement, Dredging, Ecosystem, Environmental effects, Solid wastes.

The Environmental Protection Agency has adopted regulations affecting procedures for reviewing applications for ocean dumping and the substantive criteria for evaluating those applications. The regulations specify in detail the considerations involved in determining whether to issue a permit. They also create more comprehensive guidelines regarding the disposal of dredged material. Eight major substantive changes were made by the new regulations. Among these changes are new levels which estimate concentrates of waste which are not acutely toxic or harmful; a permit system forcing dumpers to find satisfactory alternatives as soon as possible; and environmental criteria consistent with criteria established under other laws concerning discharges into inland waters. The procedures established in reviewing applications for ocean dumping permits allow time for responsible participation in the review process while, at the same time, expediting that process. Another major change deals with the definition of 'trace contaminants'. The criteria for defining 'trace contaminants' is based on impacts on the ecosystem, measured by bioassays. (Rieck-Florida)
W78-03369

PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS FOR NEW SOURCE NPDES PERMITS.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 6G.
W78-03370

EXISTING REMEDIES FOR WATER POLLUTION,
Florida Univ., Gainesville. School of Law.
B. S. Russell.
Available from Eastern Water Center, University of Florida, Gainesville, Florida 32611, for $1.75. Spring 1970. 31 p.

Descriptors: *Water pollution control, *Florida, *Pollution abatement, *Penalties(Legal), *Remedies, Regulation, Governments, Common law, Negligence, Law enforcement, Legislation, Water quality standards, Water rights, Trespass, Rivers and Harbors Act, Federal Water Pollution Control Act, Legal aspects, Compensation, Navigable waters, Reasonable use, Water pollution, Damages.

Pollution control is best handled by the governmental agencies created for that purpose. Because of the inadequacies in common law, there have been many developments in federal, state and local legislation to control and protect water quality. These developments have, in turn, had an impact upon traditional private remedies for water pollution. Federal control over pollution is accomplished by the Federal Water Pollution Control Act. This act limits private remedies because compliance with the standards of the Act is a defense to pollution allegations. In Florida enforcement of clean waters is shared by the State Board of Health and the Florida Department of Air and Water Pollution Control. The Florida statutes under which the agencies operate attempt to protect private actions, as well as allowing for state actions. The principal theories of action used by individuals are nuisance, trespass, negligence, strict liability and inverse condemnation. The claims are subjected to a balancing of conveniences test in which the court will attempt to measure benefits and costs to each. The defenses raised are the statute of limitations, prescription, laches and agreement. (Maass-Florida)
W78-03372

SALT WATER INTRUSION IN FLORIDA (LEGAL APPROACHES TO PREVENTION AND CONTROL),
Florida Univ., Gainesville. School of Law.
J. G. Helwig.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida, 32611, for $2.45. Spring 1969, 38 p.

Descriptors: *Saline water intrusion, *Hydrologic aspects, *Florida, *Well regulations, Aquifer systems, Aquifers, Coasts, Groundwater, Permeability, Saline water barriers, Tidal streams, Wells, Freshwater, Water pollution, Mixing, Encroachment, Well permits, Drilling, Saline water-fresh water interfaces, Legislation, Canals, Artesian wells.

Sea water, which is heavier than fresh water because of dissolved salts, moves into fresh water supplies in coastal areas if the fresh water level becomes too low. Invading salt water may extend upstream where tidal waters have access to the stream and the stream flow is not great enough to sweep the salt water out. If the fresh water aquifer is open to the sea, lowering the freshwater level permits direct inflow of salt water. Also, residual salt water trapped beneath impervious rock layers may contaminate higher fresh water aquifers when improper well drilling techniques or equipment allow vertical mixing of the aquifers. Salt water intrusion in Florida results from increased water use, excessive drainage, lack of protection against tidal waters in canals, improper drilling techniques, and waste. Corrective legal measures include artesian well capping statutes to prevent waste, implementation of salt water barrier lines in tidal channels, and licensing and regulation of well drilling. Florida has either enforcement or statutory problems in each of these areas. (Malloy-Florida)
W78-03373

PORTER COUNTY CHAPTER OF IZAAK WALTON LEAGUE OF AMERICA, INCORPORATED V. TRAIN (PROCEDURAL RULES FOR INTERVENORS IN ENVIRONMENTAL PROTECTION AGENCY ADMINISTRATIVE HEARINGS).
For primary bibliographic entry see Field 6E.
W78-03377

SAVE THE BAY, INCORPORATED V. MISSISSIPPI AIR AND WATER POLLUTION CONTROL COMMISSION (HEARING REQUIREMENTS FOR DISCHARGE PERMITS UNDER NPDES).
For primary bibliographic entry see Field 6E.
W78-03378

APPALACHIAN POWER COMPANY V. TRAIN (REVIEW OF EPA REGULATIONS GOVERNING DISCHARGE OF HEAT).
For primary bibliographic entry see Field 6E.
W78-03380

DUPONT DE NEMOURS COMPANY V. TRAIN (EFFLUENT LIMITATIONS BASED UPON INDUSTRY-WIDE REGULATIONS PERMISSIBLE UNDER SECTION 301).
For primary bibliographic entry see Field 6E.
W78-03381

NO OIL, INCORPORATED V. OCCIDENTAL PETROLEUM CORPORATION (EXEMPTIONS FROM PERMIT REQUIREMENTS UNDER THE CALIFORNIA COASTAL ZONE CONSERVATION ACT).
For primary bibliographic entry see Field 6E.
W78-03385

PLEASANT VIEW UTILITY DISTRICT V. VRADENBURG (RECOVERY FOR TAKING OF FLOWAGE EASEMENT BARRED BY STATUTE OF LIMITATIONS).
For primary bibliographic entry see Field 6E.
W78-03389

FLORIDA SAFE DRINKING WATER ACT (PROPOSED LEGISLATION).
For primary bibliographic entry see Field 6E.
W78-03390

CARMEL VALLEY VIEW, LIMITED V. BOARD OF SUPERVISORS, IN AND FOR COUNTY OF MONTEREY (DENIAL OF USE OF SEPTIC TANKS IN PROPOSED SUBDIVISION).
For primary bibliographic entry see Field 6E.
W78-03393

CITY OF BOULDER V. BOULDER AND LEFT HAND DITCH COMPANY (RIGHTS OF JUNIOR APPROPRIATORS TO RETURN FLOW).
For primary bibliographic entry see Field 6E.
W78-03398

STATE EX REL. BROWN V. BROOKSIDE RECLAMATION, INCORPORATED (EXHAUSTION OF ADMINISTRATIVE REMEDIES REQUIRED BEFORE INSTITUTION OF NUISANCE ACTION).
For primary bibliographic entry see Field 6E.
W78-03399

ARKANSAS RIVER BASIN COMPACT, KANSAS-OKLAHOMA.
For primary bibliographic entry see Field 6E.
W78-03408

BIG BLUE RIVER COMPACT, KANSAS-NEBRASKA.
For primary bibliographic entry see Field 6E.
W78-03409

WATER QUALITY ACT.
For primary bibliographic entry see Field 6E.
W78-03412

HOOKER CHEMICALS AND PLASTICS CORPORATION V. TRAIN (REVIEW OF ENVIRONMENTAL PROTECTION AGENCY'S NEW SOURCE REGULATIONS FOR PHOSPHATE MANUFACTURING INDUSTRY).
For primary bibliographic entry see Field 6E.
W78-03413

HOOKER CHEMICALS AND PLASTICS CORPORATION V. TRAIN (FEDERAL COURT REVIEW OF ENVIRONMENTAL PROTECTION AGENCY GUIDELINES).
For primary bibliographic entry see Field 6E.
W78-03414

AMERICAN IRON AND STEEL INSTITUTE V ENVIRONMENTAL PROTECTION AGENCY (JURISDICTION FOR JUDICIAL REVIEW OF ENVIRONMENTAL PROTECTION AGENCY REGULATIONS).
For primary bibliographic entry see Field 6E.
W78-03416

NON-POINT WATER QUALITY MODELING IN WILDLAND MANAGEMENT: A STATE-OF-THE-ART ASSESSMENT (VOLUME I-TEXT).
Forest Service (USDA), Washington, DC.
For primary bibliographic entry see Field 5B.
W78-03417

MATHEMATICAL METHODS FOR USE IN PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
M. Nakamura, and E. D. Brill, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 660, Price codes: A09 in paper copy, A01 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 130, November 1977. 168 p, 23 tab, 30 fig, 7 ref, 2 append. OWRT A-082-ILL(2).

Descriptors: Optimization, *Regional planning, *Sewage treatment, Pollution, *Alternative planning, *Input-output analysis, Regional analysis, Mathematical studies, *Waste water treatment, Water pollution control, Branch and bound tree(Matrix).

A mathematical method is presented that deals with regionalization of wastewater systems, a complex public sector planning problem. The method focuses on generating alternative physical plans efficiently and systematically so that planning issues other than economic efficiency may be meaningfully integrated into the process of comparing alternative plans. Such a method, although simple in concept, can aid analysts in developing insights. Two types of alternative plans can be generated by the method, single-time period plans and simplified multiperiod plans. In generating alternatives plans, the method takes advantage of the structure of a branch-and-bound algorithm. A branch-and-bound tree may be transformed into a matrix called the imputed value incidence matrix which displays the incidence relationship between each of the alternative plans and the state of variables (regional facilities) associated with it. Once the matrix is constructed the imputed value of a given variable or a given set of variables can be obtained from the matrix. An application of the method to a realistic example problem is presented and the interpretation of imputed values is discussed.
W78-03420

MIXED INTEGER PROGRAMMING MODELS FOR WATER RESOURCES MANAGEMENT,
Utah Water Research Lab., Logan.
B. Finney, W. J. Grenney, A. B. Bishop, and T. C. Hughes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 699, Price codes: A13 in paper copy, A01 in microfiche. Utah Water Research Laboratory Publication PRWG198-1, December 1977. 287 p, 33 tab, 12 fig, 42 ref, 7 append. OWRT B-145-UTAH(1), 14-34-0001-7132.

Descriptors: *Programming, Model studies, *Optimization, River basin development, *Planning, Water resources, Water supply, Water quality, *Regional analysis, *Simulation analysis, Path of pollutants, Waste water treatment, *Jordan River(Utah).

A regional water quality control model is developed by linking a steady-state water quality simulation model with an optimization model. The water quality simulation model can be applied to complex river systems with both point and non-point loads using multiple interdependent pollution parameters described by either linear or nonlinear equations. Twelve water quality parameters can be modeled simultaneously: four nonconservative constituents (or conservative constituents if the decay rate is set equal to zero); coliform bacteria (MPN); phosphorus; biochemical oxygen demand (BOD); ammonia (NH3); nitrate (NO3); dissolved oxygen (DO); temperature (C); and algae. The water quality model is used to generate constraint equations for the optimization model. The optimization model is formulated as an integer programming problem in which the integer decision variables are wastewater treatment levels or dif-

fuse source management practices to be determined for each load. The model considers the addition or upgrading of wastewater treatment with structural and nonstructural schemes for both point and diffuse pollution sources. A least cost solution is found subject to water quality standards at surveillance points. Additional constraints can include uniform and zoned uniform treatment. Low flow augmentation and bypass piping can be considered with slight water quality simulation model modification. A simulation model-optimization model iteration procedure is used to find an optimum solution.
W78-03421

PROCEEDINGS, RESEARCH PLANNING CONFERENCE ON THE AQUATIC PLANT CONTROL PROGRAM, 22-24 OCTOBER 1975, CHARLESTON, S.C.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 072, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper No. A-76-2, (Final Report), December 1976. 129 p, 3 append.

Descriptors: *Herbicides, *Aquatic weed control, *Biocontrol, *Chemcontrol, *Pesticide residues, *Aquatic Plant Control Program, U.S. Army Corps of Engineers, Water hyacinth, Alligatorweed, Insects, Pathogenic fungi, Bacteria, Water pollution control, Eutrophication, Water pollution treatment, Model studies, Eichhornia crassipes, Hydrilla verticillata, Alternanthera philoxeroides, Eurasion water milfoil, Myriophyllum spicatum, White amur, Ctenopharyngodon idella.

The Research Planning Conference on the Aquatic Plant Control Program of the U.S. Army Corps of Engineers was held October 22-24, 1975 in Charleston, South Carolina. The conference was arranged by the Construction-Operations Division, Directorate of Civil Works, of the Office of the Chief of Engineers to review current operations activities and current research projects of the Aquatic Plant Control Program. Three general types of research are described: (1) effects and fate of herbicides in the aquatic environment, including 2,4-D in slow-moving water, and controlled-release herbicides (2) biological control agents, including insects, white amur, pathogenic fungi, and pathogenic bacteria; and (3) use of integrated control methods, such as combinations of pathogens and insects tested at Lake Concordia, Louisiana. An overview of the research program discusses other research efforts not reported in these proceedings--rapid survey techniques, a mathematical model for selection of appropriate control techniques for a given problem, and mechanical control--as well as efforts to redirect the control program to be more operationally oriented. Several papers also deal with state certification programs for applicators of aquatic herbicides (Georgia, Florida, Texas, Oklahoma, and Arkansas), and surveys are given of aquatic weed problems in Puerto Rico, Oklahoma, Mexico, and Texas. (See W78-03430 thru W78-03443) (Lynch-Wisconsin)
W78-03429

HISTORY OF THE AQUATIC PLANT CONTROL PROGRAM,
Office of the Chief of Engineers (Army), Washington, D. C. Construction Operations Div.
E. O. Gangstad.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p C3-C9, December 1976. 1 tab.

Descriptors: *History, *Aquatic weed control, *U.S. Army Corps of Engineers, *Aquatic Plant Control Program, Biocontrol, Chemcontrol, Herbicides, Alligatorweed, Pesticide residues, Environmental effects, Insects.

Ten years of activity of the Research Advisory Committee of the Expanded Project for Aquatic Plant Control are reviewed. The Federal Rivers and Harbors Act of 1965 authorized the aquatic plant control program under the jurisdiction of the U.S. Army Corps of Engineers. The first meeting of the committee was held in Galveston, Texas in October 1966. In 1965 there were five research programs underway: (1) U.S. Department of Agriculture (Crops and Entomology), on herbicides and insect control; (2) U.S. Fish and Wildlife Service, on the effects of herbicides on fish and benthic organisms; (3) Federal Water Control Administration, on pesticide residue toxicity; (4) Auburn University, on the environmental effects of herbicide treatment; and (5) University of Southwestern Louisiana, on the effects of synergistic agents on herbicide cntrol. Research on aquatic plant control since 1966 has included: (1) a carbon dioxide laser (1968) for control of aquatic plants; field model test results did not justify field application; (2) controlled-release herbicides (1968) (no successful field application as yet); (3) use of herbivorous fish (1969), including development of monosex white amur; a large-scale test program is being planned for Lake Conway, Florida; (4) residues of 2,4-D, endothall, and diquat in fish and shellfish (1970); and (5) control of alligatorweed (1971). The Aquatic Plant Control Program is a cooperative program involving 12 states, with costs shared at 70% federal and 30% state. (See also W78-03429), (Lynch-Wisconsin)
W78-03430

RECENT SOUTH AMERICAN FIELD STUDIES OF PROSPECTIVE BIOCONTROL AGENTS OF WEEDS,
Agricultural Research Service, Stoneville, MS. Southern Weed Science Lab.
G. B. Vogt, and H. A. Cordo.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 36-55, December 1976. 1 tab, 29 ref.

Descriptors: *South America, *Biocontrol, *Insects, *Aquatic weed control, Weed control, Agriculture, Ecology, Niches, Water hyacinth, Gulf Coastal Plain, Southeast U.S., Regions, Brazil, Argentina, Paraguay, Uruguay, Host specificity, Alligatorweed, Water milfoil, Myriophyllum, Egeria, Alternanthera, Eichhornia.

Potential use of South American insects as weed biocontrol agents in southern U.S. states was studied in terms of biogeography, ecology, and host plant specificity in Brazil, Argentina, Paraguay, and Uruguay. Priority was given to three aquatic (Myriophyllum, Egeria, and Alternanthera) and three row crop weeds (Sida, Anoda, and Amaranthus). Attention was also given to Eichhornia, Pontederia, and Pistia. Possible control agents for each plant are discussed in detail, followed by an analysis of biogeographical and ecological considerations. For Myriophyllum brasiliense control, it appears that lysathia flavipes is nearly an ecological homolog of the North American L. ludoviciana, and Hyperodes marginicollis is an ecological analog of Perenthis vestitus. No insects were found affecting Egeria densa of E. naias. Regarding alligatorweed, Disonya argentinensis is clearly an ecological nonhomolog or nonanalog, and is a more specialized and possibly more effective agent that the North American D. xanthomelas and D. collata; more testing for host specificity is needed, however. Enemies of row crop weeds appear to be ecological homologs of species already found in the southern U.S. (mostly south of Vicksburg, Mississippi). Of the remaining insects, some are clearly ecological nonanalogs. (See also W78-03429) (Lynch-Wisconsin)
W78-03431

AQUATIC WEED PROBLEMS IN MEXICO AND TEXAS AND SOME OF THE MEASURES FOR THEIR CONTROL,
Texas Parks and Wildlife Dept., San Antonio. Statewide Noxious Vegetation Control Program.
L. V. Guerra.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 56-63, December 1976. 3 fig, 2 tab.

Descriptors: *Mexico, *Texas, *Aquatic weed control, *Water hyacinth, Biocontrol, Mechanical control, Chemcontrol, Herbicides, Eutrophication, Hydrilla, Water lettuce, Salvinia, White amur, Manatees, Elodea.

The aquatic nuisance weeds water hyacinth, water lettuce, and Salvinia have been problems in central and southern Mexico since 1890, and Hydrilla is currently present in the water-supply lake of the city of Monterey. Submerged problem weeds are Chara, Najas sp., and Myriophyllum sp. Manual and mechanical measures have not been adequate for suppression of water for irrigation is too valuable; harvesters have created algal blooms, while chemicals are expensive and application information is lacking. White amur have been successfully used for biocontrol, but manatees succumbed to disease. In Texas the major aquatic weed problem is water hyacinth, but of the nine watersheds with water hyacinth or alligatorweed problems, four are in a control phase and five are at the maintenance level. In many maintenance lakes, however, receding water levels, warm days, and moisture have produced a new hyacinth crop every 60-90 days. Access to these areas of shallow water and dense brush is virtually impossible, and a special vehicle is needed. Although the Guadalupe River has been largely cleared of hyacinths, an invasion of Elodea has occurred. Alligatorweed is being controlled in the north coastal area with flea beetles (Agasicles sp.). Research on chemical methods of hydrilla control showed Hydeout produced the greatest plant knockdown. (See also W78-03429)
W78-03432

FIELD TRIP, GOOSE CREEK RESERVOIR,
Army Engineer District, Charleston, SC.
For primary bibliographic entry see Field 4A.
W78-03433

AQUATIC PLANT PROBLEMS IN PUERTO RICO,
Army Engineer District, Jacksonville, FL. Aquatic Plant Control Section.
For primary bibliographic entry see Field 4A.
W78-03434

RECONNAISSANCE SURVEY OF AQUATIC WEED INFESTATIONS IN LAKES AND NAVIGABLE STREAMS IN OKLAHOMA,
Oral Roberts Univ., Tulsa. Dept. of Natural Science.
R. Couch.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 26-35, December 1976. 1 fig, 3 tab, 14 ref.

Descriptors: *Oklahoma, *Aquatic weed control, *Eurasian water milfoil, Lakes, Streams, 2,4-D, Chemcontrol, Mechanical control, Reservoirs, Baseline studies, Myriophyllum spicatum, Water willow, Dianthera americana.

A comprehensive survey of aquatic weed infestations in Oklahoma shows that Eurasian water milfoil (Myriophyllum spicatum) and water willow (Dianthera americana) are the most serious problems. Water star grass (Heteranthera dubia), Chara spp., and filamentous algae (Pithophora and Spirogyra) are other problem plants. M. spicatum was first officially reported in 1964, but unofficial reports go back to 1938. An estimated 8,206 acres

are currently infested by the weed, which was probably introduced via aquarium dealers. The worst infestations are in Lake Thunderbird, Fort Cobb Reservoir, Shawnee Twin Lakes, Wichita Mountains Wildlife Refuge, and Lake Humphries. Propagated by seeds or vegetative fragments, it is spaced mainly by boats, other recreational gear, or by birds. Plant fragments can survive up to 21 days of drying. The herbicide 2,4-D has been effectively used in Fort Cobb Reservoir, where evapotranspiration had become a serious problem. Moderate to dense stands of D. americana occur in 12 Oklahoma lakes and streams, mostly in the northeast; the plant grows along shores in water up to 10 ft deep. A total of 1,500 acres is infested. Limited mechanical control has been used in Spavinaw Lake. Recommendations are that a control rather than eradication program be established for water milfoil together with yearly aerial reconnaissance surveys of infested areas. (See also W78-03429) (Lynch-Wisconsin)
W78-03435

AQUATIC WEED VERSUS PLANT PATHOGEN, A STUDY OF A BIOLOGICAL CONTROL IN ACTION,
Florida Univ., Gainesville. Dept. of Plant Pathology.
K. E. Conway, T. E. Freeman, and R. Charudattan.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 85-89, December 1976. 6 fig. DACW 73-73-0049.

Descriptors: *Biocontrol, *Aquatic weed control, *Water hyacinth, *Pathogenic fungi, *Cercospora rodmanii, Fungi, Reservoirs, Lakes, Florida, Seasonal, Succession, Eichhornia crassipes, Rodman Reservoir(FL), Lake Alice(FL).

A pathogenic fungus, Cercospora rodmanii, is being tested as a biocontrol against water hyacinth in Lake Alice and Rodman Reservoir, Florida. The fungus was isolated after widespread decline of water hycinth (Eichhornia crassipes) was observed in the reservoir in 1971. Inoculations of C. rodmanii were applied to a small 1.7-ha pool of Lake Alice in September-October 1974; a 6.4-m spray arc from the bank covered 64.42 sq m. The entire pool, as well as part of Lake Alice, was infected by late November. By January browning was complete in the pool, and plants appeared to have been killed. Warm temperatures caused new growth in late January and February, but plants reached only 6 in. instead of the normal 2-3 ft; in Lake Alice plants attained the normal 3-4 ft height. By June new leaves were outgrowing the disease, despite four additional sprayings; but with cooler fall temperatures a general browning occurred by mid-September, a month ahead of the previous year. In Rodman Reservoir, where disease severity had declined since 1971, five sprays were applied from the shoreline in February-May 1975 to test plots at the reservoir's edge. By mid-April, a growth reduction was noted, in addition to complete browning of plants in the main part of the reservoir by June due to a heavy natural infection. In one of the spray areas 35-40 acres of water opened by mid-October, but a 20-acre water lettuce invasion replaced dead water hyacinth in another area. (See also W78-03429) (Lynch-Wisconsin)
W78-03436

EXTENSIVE DEGRADATION OF SILVEX BY SYNERGISTIC ACTION OF AQUATIC MICROORGANISMS,
Syracuse Univ. Research Corp., NY.
For primary bibliographic entry see Field 5B.
W78-03437

CONTROLLED RELEASE HERBICIDES - RUBBER FORMULATIONS,
Creative Biology Lab., Inc., Barberton, OH.
G. A. Janes.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 90-94, December 1976. 4 tab. DACW-73-C-0042.

Descriptors: *Aquatic weed control, *Herbicides, *Rates of applications, *Chemcontrol, *Chronicity, *Copper sulfate monohydrate, *Slow-release treatment, Copper, Ions, Toxicity, Water hyacinth, Vallisneria americana, Cabomba caroliniana, Myriophyllum spicatum, Eurasian water milfoil, Eichhornia crassipes.

Laboratory tests show that aquatic weeds can be controlled through chronic intoxication ('chronicity') with ultralow herbicide dosages administered continually from slow-release systems. In current experiments, chronicity of copper sulfate monohydrate was demonstrated in tests on Vallisneria americana, Cabomba caroliniana, Myriophyllum spicatum (Eurasian water milfoil), and Eichhornia crassipes (water hyacinth). An effective level of copper ion can be released over 5-7 months. Plants were potted in topsoil, placed in 1-gal glass aquaria containing 3 liters deionized water, and allowed th stabilize for four weeks. E-51 pellets were then added at 1, 10, 50, and 100 ppm with respective copper ion contents of 0.175, 1.75, 8.75, and 17.5 ppm. Temperature was maintained at 70-76F. Little significant difference was noted by pellet size, and chronic intoxication rate may have been exceeded. At 100 ppm for V. americana 100% mortality was achieved by the 60th day, for M. spicatum 79% mortality by the 60th day, and for C. caroliniana 100% mortality by the 35th day. At 1 ppm for V. americana and M. spicatum mortality at 10 ppm in 40 days, and at 50 ppm in 35 days. At copper ion concentrations of 0.03, 100% mortality was achieved for V. americana in 60 days and for C. caroliniana in 45 days; mortality was 80% for M. spicatum in 60 days. After 60 days mortality in controls ranged from 7-25%. (See also W78-03429) (Lynch-Wisconsin)
W78-03438

LARGE-SCALE FIELD TEST WITH THE MONOSEX WHITE AMUR IN FLORIDA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. L. Decell.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 112-126, December 1976. 13 fig, 1 tab.

Descriptors: *Biocontrol, *Aquatic weed control, *White Amur monosex fish, *Lake Conway(FL), Ecosystems, Model studies, Florida, Lakes, Baseline studies, Monitoring, Hydrilla verticillata, Ctenopharyngodon idella.

The White Amur fish, Ctenopharyngodon idella, was chosen among various aquatic weed control agents by the U.S. Army Corps of Engineers for operational-scale testing because of its great control potential as evidenced in research programs. Biological control appears to offer the best long-term permanent solution to many aquatic weed problems. The experiment will use monosex (female) white amur to control Hydrilla verticillata in the 1,820-acre Lake Conway, Florida chain of five lakes. Monosex fish minimize but do not eliminate the risk of reproduction. The project schedule is: (1) January 1976-March 1977, baseline data collection; (2) spring 1977, stocking of white amur; and (3) spring 1977-1980, continuous monitoring of data groups. Three major models are currently being developed, including a white amur stocking model, an ecosystems response model, and an operations model. All are deterministic models intended to display responses for given conditions, and are primarily based on currently available data. The fish will be obtained from 35,000 produced in a monosex spawning experiment in Stuttgart, Arkansas by the U.S. Fish and Wildlife Service. (See also W78-03429) (Lynch-Wisconsin)
W78-03439

POSSIBLE EFFECTS OF THE INTRODUCTION OF THE WHITE AMUR INTO LAKE CONWAY, FLORIDA,
Florida Univ., Gainesville. School of Forest Resources and Conservation; and Florida Univ., Gainesville. Center for Wetlands.
For primary bibliographic entry see Field 5C.
W78-03440

INTEGRATED CONTROL OF WATER-HYACINTHS WITH FOUR BIOLOGICAL AGENTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
W. N. Rushing.
In: Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 106-109. 1 fig.

Descriptors: *Biocontrol, *Aquatic weed control, *Water hyacinth, *Insects, *Pathogenic fungi, Louisiana, Testing procedures, Eichhornia crassipes, Water hyacinth weevil, Neochetina eichhorniae, Arzama densa, Cercospora, Acremonium zonatum, Lake Concordia(LA).

Combinations of four biological control agents were applied to experimental plots of water hyacinth (Eichhornia crassipes) at Lake Concordia, Louisiana: (1) the water hyacinth weevil Neochetina eichhorniae, (2) moth Arzama densa, (3) fungus Cercospora, and (4) zonate leaf spot fungus Acremonium zonatum. Tests plots consisted of 64 aluminum-pipe frames 2 m by 2m by 46 cm high, supporting a perimeter of chicken wire and a flooring of nylon-mesh netting. In early spring 1975 plants were collected locally and placed in the enclosures. Plant weight and height were measured at two-week intervals. Weight was determined through lifting the enclosure with an electronic winch supported by two boats; plants were held in place by nylon net. Each agent alone was tested, plus eight treatment combinations and four controls; each treatment included four replications. Little effect of Arzama or Acremonium alone was noted in preliminary observations, but Neochetina alone resulted in total plant weight per plot of about 106 kg by the end of September 1975, compared with 140 kg in control plots. Cercospora plots registered total weight of about 127 kg. A combination of Arzama and Neochetina resulted in total plant weight of about 100 kg by September 30, compared with about 95 kg for Arzama, Neochetina, and Cercospora together, and 75 kg for all four agents in combination. (See also W78-03429) (Lynch-Wisconsin)
W78-03441

2,4-D IN SLOW-MOVING WATER,
University of Southwester Louisiana, Lafayette. Dept. of Plant Industry.
For primary bibliographic entry see Field 5B.
W78-03442

WATERHYACINTHS - A NUISANCE OR A BENEFIT,
National Aeronautics and Space Administration, Bay Saint Louis, MS. National Space Technology Labs.
B. C. Wolverton.
In: Proceedings, Research Planning Conference on Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C., p 110-111, December 1976. 8 ref.

Descriptors: *Water hyacinths, *Biological treatment, *Water pollution treatment, *Beneficial use, Waste treatment, Sewage treatment, Benefits, Suspended solids, Pollutants, Nutrients, Sewage lagoons, Methane, Fertilizers, Feeds, Heavy metals, Eichhornia crassipes.

Water hyacinth, Eichhornia crassipes, can be used beneficially for removal of pollutants from waste water and for production of many useful raw

materials. In sewage lagoons containing warm, enriched sewage, water hyacinths grow at a phenomenal rate of 8-16 tons of biomass per acre per day and are capable of absorbing, metabolizing, and concentrating large amounts of chemical pollutants at predictable rates, rendering the plants suitable for biological heavy metal monitoring systems. In waste treatment lagoons they can reduce total suspended solids and DOD5 levels and remove nutrients and other pollutants. Animal feed and fertilizer can be produced from water hyacinths grown in domestic sewage free of toxic heavy metals, and methane gas from plants grown in any type of chemical or sewage wastewaters. Harvested plants possess valuable protein, nutrients, and other minerals. Economical transporation and utilization of the harvested material requires drying, because the plants contain about 95% water by weight. Mechanical dewatering is unsuitable as pressing results in loss of large quantities of nutrients. A newly designed solar drying system, which will begin operation in April-May 1976, will reduce moisture to an optimum 5%. Water hyacinths grown in nutrient-rich sewage contain up to 20-25% crude protein by dry weight. (See also W78-03429) (Lynch-Wisconsin)
W78-03443

EFFECT OF VEGETATION ON LANDFILL STABILIZATION,
Auburn Univ., AL. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-03448

DEVELOPMENT OF SUSPENDED SOLIDS QUALITY CONTROL AND PERFORMANCE EVALUATION SAMPLES,
Weston (Roy F.), Inc., West Chester, PA.
For primary bibliographic entry see Field 5A.
W78-03450

EVALUATION OF INSTRUMENT FOR THE DETERMINATION OF PHENOL IN WATER,
Central State Univ., Wilberforce, OH. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-03452

THE ENVIRONMENTAL EFFECTS OF USING COAL FOR GENERATING ELECTRICITY,
Argonne National Lab., IL.
For primary bibliographic entry see Field 6G.
W78-03455

USER HANDBOOK FOR THE ALLOCATION OF COMPLIANCE MONITORING RESOURCES,
Systems Control, Inc., Palo Alto, CA.
G. P. Grimsrud, E. J. Finnemore, W. J. Winkler, R. N. Patton, and A. I. Cohen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 692, Price codes: A15 in paper copy, A01 in microfiche. Report No. EPA-600/5-76-012, December 1976. 314 p, 31 fig, 65 tab, 32 ref. 1HC619, 68-01-2232.

Descriptors: *Waste water(Pollution), *Monitoring, *Data collections, Regulation, Water quality standards, Effluents, Statistical methods, Environment, Cost-benefit analysis, Resource allocation, *Standards compliance, Environmental planning.

A handbook designed for use by environmental planners and managers, presents the development and successful demonstration of hand and computerized procedures for the design of effluent compliance monitoring systems; a guide for determining whether effluent sources are in compliance with effluent standards was the objective. The procedures outlined incorporated Federal regulation requirements for compliance monitoring to validate self-monitoring reports and support enforcement actions, including scheduled and random quality control inspection of monitoring reports and equipment, follow-up inspections when an effluent standard violation is suspected, and ad hoc intensive surveys when there is evidence of a water quality violation. The procedure developed determines how often to monitor each source in a region to obtain maximum benefit from the compliance monitoring program, using information from past self-monitoring, ambient monitoring, and compliance monitoring reports. Resource allocation procedures and criteria are described as dependent on determination of statistical characteristics of effluent streams. The maximum marginal return method for solving the resource allocation problem is based on the concept of allocating resources where marginal return is greatest, yielding a relation between minimized cost of undetected violations and the corresponding resource cost. Thus, by setting up a priority list for monitoring tasks and removing samples from the list that have been allocated, the remaining items will be, in descending order, the ones that should be monitored with an increase in resources. General requirements for manpower, data, and computers for either hand or computer calculation are described, and procedures are demonstrated for both calculation methods. Computer program documentation is included as the Effluent Monitoring Program (EFFMON). (Wares-IPA)
W78-03458

LAKE CONSTANCE: ENDANGERMENT AND POSSIBILITIES FOR REHABILITATION, (IN GERMAN),
Freiburg Univ. (West Germany). Limnologisches Inst.
For primary bibliographic entry see Field 5C.
W78-03464

SEEPAGE FROM OXIDATION PONDS,
Tahal Water Planning for Israel Ltd., Tel Aviv. Dept. of Sewage Reclamation.
For primary bibliographic entry see Field 5B.
W78-03472

SIXTH SEMIANNUAL INTERAGENCY BRIEFING FEBRUARY 1976, WASHINGTON, D.C.,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
C. C. Calhoun, Jr, R. M. Engler, M. D. Malkasian, R. M. Mecca, and H. K. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 187, Price codes: A08 in paper copy, A01 in microfiche. Miscellaneous Paper D-76-19, July 1976. 136 p, 90 fig, 2 append.

Descriptors: *Dredging, *Research and development, *Projects, Disposal, Water, Monitoring, On-site investigations, Environmental effects, Sampling, Oceans, Movement, Costs, *Dredged material, *Research programs, Dredging costs, Disposal area.

Briefings given semiannually to representatives of the Corps of Engineers and other Federal agencies were edited to present the status of the Dredged Material Research Program (DMRP). Significant progress was made in all DMRP project areas as evidenced by the shift of emphasis from paper and laboratory studies to field studies. The latter were the testing grounds for many of the concepts explored and verified by laboratory results. Other field studies demonstrated the productive uses of dredged material and the feasibility of dredged material becoming a natural resource. Problems, accomplishments, and objectives within each of four projects were discussed: the Environmental Impacts and Criteria Development Project, the Habitat Development Project, the Disposal Operations Project, and the Productive Uses Project. The research covered a diversity of problems on the disposal, effects of disposal, and possible uses of dredged material. The research was conducted under contract with universities, cooperations, and Government agencies throughout the United States. In February 1976, the DMRP was 60% complete. (Roberts-ISWS)
W78-03477

LANDSCAPE CONCEPT DEVELOPMENT FOR CONFINED DREDGED MATERIAL SITES,
Mann (Roy) Associates, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5E.
W78-03478

FIRST ANNUAL REPORT ENVIRONMENTAL PROTECTION AGENCY/CORPS OF ENGINEERS TECHNICAL COMMITTEE ON CRITERIA FOR DREDGED AND FILL MATERIAL,
Environmental Protection Agency, Washington, DC.
F. G. Wilkes, and R. M. Engler.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A040 662, Price codes: A04 in paper copy, A01 in microfiche. Report, March 1977. 53 p, 1 tab, 1 ref, 2 append.

Descriptors: *Dredging, *Environmental control, *Landfills, Water pollution control, Marine plants, Ecology, Mixing, Wetlands, Biocontrol, Research and development, Information exchange, Wastes, Marine protection.

A technical committee of scientists and engineers from research elements of the Environmental Protection Agency (EPA) and the Army Corps of Engineers Waterways Experiment Station (CE) was formed in late 1975 to act as a focal point for coordinating and disseminating agency research related to regulatory functions pursuant to Sections 404 and 103 of Public Laws 92-500 and 92-532, respectively. The committee was chaired by the EPA and CE. A major goal of the Technical Committee was the development of a comprehensive manual for technical implementation of all technical phases of Public Laws 92-500 and 92-532. Other objectives of the Technical Committee were to recommend needed research priorities in order to implement fully Sections 404 and 103, to establish joint projects and priorities, to conduct joint program reviews, to avoid duplication of effort, and to exchange and to disseminate research results. A listing of 16 research areas was presented, with each area of research assigned an overall priority; projected costs and duration of study also were presented. (Roberts-ISWS)
W78-03481

OIL SPILL RECOVERY METHOD AND APPARATUS,
R. S. Jenkins.
U.S. Patent No. 4,038,182, 7 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 960, No 4, p 1747, July 26, 1977.

Descriptors: *Patents, *Oil spills, *Oily water, *Water pollution control, *Water quality control, Separation techniques, Vortices, Flow, Equipment, Oil recovery.

A method and apparatus recovers an immiscible oily substance spread as an oily film over the surface of a body of water by forming a vortex in the water mass to attract the oily film and water. The water and oily film flow into the vortex and then flow into a quiescent zone to enable separation of the oily film and water. The separated oil is retained in a receiver and recovered as desired. (Sinha-OEIS)
W78-03600

METHOD FOR DESTRATIFYING BODIES OF WATER,
J. W. Clark.

U.S. Patent No. 4,039,439, 11 p, 14 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 254, August 2, 1977.

Descriptors: *Patents, *Water quality control, Water circulation, Mixing, *Stratification, Aeration, Water quality, Water treatment, Bubbles, *Destratification.

A method for improving the quality of large bodies of water so that the general overall quality is improved comprises placing in the lower reaches of a large body of water means for generating hydrogen and utilizing the bouyancy of the hydrogen as a vehicle to carry the hydrogen-saturated water to the surface so that the water is subjected to natural aeration and sunlight without the vehicular hydrogen leaving the surface of the body of water. The method is described in which the hydrogen is produced electrolytically in conjunction with oxygen and in which the hydrogen bubble sizes are controlled within a range of from 100 to 600 microns and secondary benefits are provided in that the oxygen generated combines with the hydrogen-saturated water in the lower reaches of the body to the water to tend to improve bacterial conditions in the lower reaches of the body of water. (Sinha-OEIS)
W78-03605

FLUID SEPARATION DEVICE FOR LOW TEMPERATURE ENVIRONMENTS,
Lockheed Aircraft Corp., Burbank, CA. (Assignee).
H. F. Miller, and M. G. Hoard.
U.S. Patent No. 4,039,454, 6 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 961, No 1, p 258-259, August 2, 1977.

Descriptors: *Patents, *Oil pollution, *Water quality control, *Water pollution treatment, Separation techniques, Ice, Ice-water interfaces, Equipment, Low-temperature environments.

This invention is designed to enhance the operation of oil pick-up devices which are called upon to operate in freezing temperature environments in which pieces of ice as well as fluid surface areas are found to be coated with undesirable fluids such as oil. The device separates, in an ice environment, fluids having differing physical properties which combine an oleophilic pick-up device with a rotating tumbler mechanism which tends to agitate and propel oil coated pieces of ice rearward and along a perforated inclined through-put barrier where oil jarred off the ice chunks is allowed to rise through the perforations and be contained in an area where it can be accumulated and recovered by the pick-up unit. (Sinha - OEIS)
W78-03613

METHOD FOR CONDITIONING FRESH AND SEA WATERS FROM OIL,
Snam Progetti S.p.A., Milan (Italy). (Assignee).
W. Marconi, N. Oddo, and L. Degen.
U.S. Patent No. 4,042,495, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 961, No 3, p 1274, August 16, 1977.

Descriptors: *Patents, *Oil pollution, *Water pollution treatment, *Water quality control, Microorganisms, Nutrients, Biodegradation, Nitrogen, Phosphorus, Metabolism, Hydrocarbons.

Oily hydrocarbons which pollute the surface of water are removed by scattering over the polluted surface solid particles of nutrient salt containing nitrogen and phosphorus in a form that is readily assimilable by aqueous microorganisms capable of metabolizing hydrocarbons. The particles of nutrient salt are given a surface pretreatment with paraffine so that they are buoyant and only slowly soluble in water and lipophilic. (Sinha-OEIS)
W78-03617

OIL WATER SEPARATOR,
P. M. McCarthy, G. T. McTighe, and R. T. McTighe.
U.S. Patent No. 4,042,512, 5 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 961, No 3, p 1279, August 16, 1977.

Descriptors: *Patents, *Separation techniques, *Oily water, *Oil pollution, Water pollution treatment, Water quality control, Flow separation, Runoff, Equipment.

The apparatus comprises a stationary tank having an inlet at one end directing incoming material onto a sloping corrugated baffle member over which the material flows downwardly and inwardly and from which the fluids are directed between upwardly sloping parallel corrugated plates to accelerate separation of water and oil or similar lightweight materials. The material flows toward the other end of the tank from which clarified water is permitted to escape from the lower regions and separated oil is withdrawn from the top. Baffle means are also provided in the bottom of the tank to intercept particulate matter settling to the bottom and an access opening adjacent the baffle permits periodic cleaning of such collected solids from the tank. The apparatus is used for clarifying run-off or drainage water containing oil and/or other lightweight materials. (Sinha-OEIS)
W78-03619

THE RISING COST OF MAKING DESERTS BLOOM,
Earthscan, London (England).
For primary bibliographic entry see Field 4B.
W78-03621

WELSH WATER RE-ORGANIZATION.
Water Services, Vol. 81, No. 978, p 453, August, 1977. 1 fig.

Descriptors: *Regional economics, *Networks, *Sewage treatment, *Water treatment, *Costs, Organizations, Foreign countries, Waste water treatment, *Wales.

The Welsh National Water Development Authority has reorganized its 25 single-purpose water supply, river, and sewage divisions into seven regional authorities which will cover all three purposes. Slated to go into effect on or about April 1, 1978, the new multipurpose divisions will be the Gwynedd, West Wales, Gower, Dee and Clwyd, Wye, Usk, and Taff divisions. The initial capital expenditure for the reorganization will be approximately 500,000 pounds and annual operating costs after the initial 3-yr period should be similar. Approximately 100 jobs, or 2% of the 5500 existing positions, will be gradually eliminated in the reorganization process, Services will be coordinated from a single headquarters location within each regional division. (Schulz-FIRL)
W78-03623

EPA ENLISTS ARMY TO MANAGE SEWAGE PLANT CONSTRUCTION.
Engineering News-Record, Vol. 199, No. 13, p 10, September, 1977.

Descriptors: *Construction, *Government finance, *Economics, *Contract administration, Standards, Treatment facilities, Municipal wastes, Government supports, Specifications, Waste water treatment.

The EPA has enlisted the aid of the U. S. Army Corps of Engineers in the supervision of design and construction of federally-funded municipal waste water treatment plants. The Corps will insure smooth construction for large projects, review design specifications and bid documents, identify construction problems and solutions, and cooperate with the community's private consulting engineer. The tentative agreement between the Corps of Engineers and the EPA was announced after the release of a report by the General Accounting Office that cited problems in design and construction stages in the EPA's multibillion dollar construction program. The Corps will provide 600 man-yrs at a cost of $20 million during the first year of the program, which is still subject to approval by the Office of Management and Budget. (Schulz-FIRL)
W78-03625

ORSANCO: AN INTERSTAGE AGENCY,
Ohio River Valley Sanitation Commission, Cincinnati.
R. Boes, and L. Weaver.
AIChE Symposium Series, Vol. 73, No. 167, p 262-266, 1977. 1 ref.

Descriptors: *Regional analysis, *Water pollution control, *Water quality management(Applied), Pollution abatement, Monitoring, Environmental effects, Project post-evaluation, River basins, River basin commissions, Ohio River, Waste water treatment.

ORSANCO (Ohio River Valley Water Sanitation Commission) has been administering a regional program to control water pollution in the 155,000-sq-mile Ohio River basin which includes Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia, and West Virginia. The commission's purposes are to coordinate the acquisition of information of stream quality characteristics, to evaluate pollution abatement, and to guide additional control efforts while insuring adequate water quality within the basin for purposes. The committee also adopts and enforces effluent limitations and standards. Biological monitoring and sampling programs have been used to assess water quality and the status of municipal and industrial control facilities. The commission was also responsible for an order to expand five waste water treatment plants in the Pittsburgh and Cincinnati metropolitan areas in 1964. Along the Ohio River, treatment facilities provide service for 99% of the 3 million sewered population and 90% of the 1700 industrial dischargers. Comparisons of water quality for 1952-53 and 1963-64 indicated lower levels of mineral constituents associated with mine drainage and waste water dischargers, higher dissolved oxygen levels, lower coliform levels, and other water quality improvements as a result of the program. Future interest of the commission will be focused on the effects and bioaccumulation of pollutants by aquatic life and on other water quality management programs. (Schulz-FIRL)
W78-03626

MARINE POLLUTION: A MULTI-FACETED, MULTI-AGENCY DETECTION, RESEARCH AND ENFORCEMENT PROGRAM.
Sea Technology, Vol. 18, No. 10, p 10-17, 49-50, October, 1977.

Descriptors: *Water pollution control, *Sewage disposal, *Oil wastes, *Oceans, *Environmental effects, Research and development, Oil water, Sludge disposal, Waste water treatment.

Activities of the numerous federal and civil organizations involved in marine pollution programs, and federal measures being taken to control or eliminate pollution of the marine environment, are described. Among the agencies involved in detection, clean-up, and research of ocean pollution are the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard. Programs being conducted by the various agencies to control ocean dumping of sewage sludge and other wastes are described. The Marine Ecosystems Analysis (MESA) project under the auspices of NOAA has investigated waste dumping and its environmental effects in the New York Bight and Puget Sound, Washington. A 7-yr study on the New York Bight was initiated to determine the

fate and effect of pollutants on the ecosystem, to quantify environmental factors involved in designing and siting offshore structures, and to provide other information on coastal processes. Various projects on oil pollution and the disposal of oily wastes are described. Studies being conducted by the U.S. Navy on treatment and disposal of sanitary sewage for ships are described. (Schulz-FIRL)
W78-03628

URBAN STORMWATER MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. W. Labadie.
In: Stochastic Approaches to Water Resources, Volume II. Edited and Published by Hsieh Wen Shen, Colorado State University, Fort Collins, 1976. p 19-1 to 19-48. 19 fig, 5 tab, 62 ref.

Descriptors: *Stochastic processes, Analytical techniques, *Planning, *Design, *Storm water, *Optimization, *Model studies, *Simulation analysis, Risks, Decision making, Management, Storage, Treatment, Waste water(Pollution), Synthetic hydrology, Rainfall, Urban runoff, Water pollution control, Costs, Data collections, Economic efficiency, Equations, Systems analysis, Forecasting, Screening model, Overflow minimization, Cost minimization, Chance-constrained programming, Search technique, Risk programming.

Demonstrated is how stochastic analysis techniques can be incorporated into the planning, design, and operation of urban stormwater control systems. The consideration of risk in decision making for Urban Stormwater Management (USWM) is emphasized. An overview of the problems associated with USWM is presented and alternative management strategies are discussed, with particular attention paid to storage-treatment combinations. A case study, the San Francisco Master Plan for Wastewater Management, highlights the present state of acceptance and application of stochastic analysis techniques; considered is the current WRE-HEC STORM screening model. Discussed is the use of stochastic-conceptual models for generating synthetic rainfall sequences, which serve as input to models predicting the runoff quantity and quality responses of urban catchments, which in turn can be used to synthetically generate urban runoff data. A general classification is presented of stochastic analysis approaches to incorporating risk in planning and design for USWM; some important stochastic optimization techniques are suggested. Finally, a simple numerical example using the STORM model to solve a cost minimization problem is presented. It is shown that with little additional effort, important information can be obtained from a stochastic analysis. With such information, decision makers can gain better insight into the effectiveness of a particular alternative. (See also W77-10439) (Bell-Cornell)
W78-03632

SELECTION OF MODELS FOR URBAN DRAINAGE PROBLEMS: TECHNICAL ASPECTS AND NON-TECHNICAL CONSTRAINTS,
MacLaren (James F.) Ltd., Willowdale (Ontario). Water Resources Group.
For primary bibliographic entry see Field 4A.
W78-03633

WATER QUALITY ASPECTS OF AGRICULTURAL AND URBAN DRAINAGE,
Rice Univ., Houston, TX.
P. B. Bedient, and W. G. Characklis.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 374-393, 1976. 12 fig, 1 tab, 20 ref.

Descriptors: *Urban drainage, *Agricultural watersheds, *Water quality, Monitoring, Surface runoff, Storm water, Sediments, Nutrients, Pollutants, Hydrology, River basins, Simulation analysis, Mathematical models, Systems analysis.

Reported are recent environmental studies conducted on agricultural watersheds in Florida and urbanizing watersheds near Houston, Texas to characterize the quantity and quality of surface runoff from various land uses. Estimates of water storage and surface runoff, which were compared to measured values of streamflow at the downstream end of the river basin, were provided in the agricultural watersheds by a hydrologic simulation model. Water quality measurements of various pollutants allowed calculation loading rates using simulated runoff at corresponding points in the basin. In the Woodland Project area in Texas, characterized by a natural drainage system and extensive lake storage for storm water runoff, storm event data were analyzed for both quantity and quality. From the description of water quality relationships from agricultural and urban watersheds, interesting similarities have been discovered. First detention time plays a key role in hydrologic and nutrient cycling as it relates to storage and treatment rates for runoff on the land, in the soil, and in lakes or streams. Secondly, storage of runoff water in ponds, lakes, and marsh areas can be used for both flood control and water quality control. Finally, while a certain amount of drainage density may be necessary in both agricultural and urban watersheds, such activity can be kept to a minimum by routing runoff through available storage, or constructing on-site detention ponds. (Bell-Cornell)
W78-03638

SIMULATION OF QUALITY OF URBAN DRAINAGE EFFLUENTS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W78-03641

INEQUITIES FOR SMALL FOOD PROCESSING PLANTS RESULTING FROM LIQUID WASTE TREATMENT REGULATIONS,
Teepak, Inc., Danville, IL.
E. W. McMillan, and E. D. Brill, Jr.
Water Resources Bulletin, Vol. 12, No. 5, p 985-993, October 1976. 5 tab, 8 ref.

Descriptors: *Water quality control, *Waste treatment, *Regulation, *Cost analysis, *Liquid wastes, *Equity, Water management(Applied), Economics, *Dairy industry, Effluents, Economies of scale, Data collection, Biochemical oxygen demand, Capital costs, Estimating, Programs, Treatment costs, Sewer surcharge.

The cost of the liquid waste treatment measures required to meet federal as well as typical state and local regulations was examined for dairy processing plants of various sites. Federal effluent standards were found to produce higher estimated capital costs per unit of raw material for smaller plants, even with relaxed requirements for smaller plants. State regulations limiting the effluent BOD5 concentration were also found to result in inequitable costs for smaller processors. These inequities result from economies of scale and not from such factors as level of process technology employed or amount of waste produced per unit of raw material. In contrast, applying an example sewer surcharge formula did not produce inequities from economies of scale. (Bell-Cornell)
W78-03648

WATER-ENERGY CONFLICTS IN MONTANA'S YELLOWSTONE RIVER BASIN,
Montana State Dept. of Health and Environmental Sciences, Billings. Bureau of Water Quality.
For primary bibliographic entry see Field 6E.
W78-03649

COASTAL RECREATION RESOURCES IN AN URBANIZING ENVIRONMENT, SYMPOSIUM, HYANNIS, MASSACHUSETTS, APRIL 12-14, 1976.
For primary bibliographic entry see Field 6B.
W78-03662

WATER CONSERVATION AND POLLUTION CONTROL IN COAL CONVERSION PROCESSES,
Water Purification Associates, Cambridge, MA.
D. J. Goldstein, and D. Yung.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 568, Price codes: A21 in paper copy, A01 in microfiche. Report No. EPA-600/7-77-065, June 1977. 467 p, 96 fig, 155 tab, 281 ref, append. EHE623, 68-03-2207.

Descriptors: *Water conservation, *Water quality control, *Water consumption, Industrial water, Water utilization, Water loss, Water requirements, Environmental effects, Coals, North Dakota, Wyoming, New Mexico, Coal mines, Water supply, Water resources, Economics, *Coal conversion processes, Processes.

The results of a study to determine water consumption and environmental impacts of coal conversion processes in Western states are presented. Brief descriptions and process water requirements are given for the Lurgi, Bigas, Carbon Dioxide Acceptor, Agglomerating Burner-gasification, Winkler, Stirred Bed, Molten Salt, Lurgi process for utility fuel gas production, Koppers-Totzek, H-Coal, and Synthoil processes, and detailed designs and analyses are given for the Hygas, Synthane, and Solvent Refined coal processes and for Lurgi combined cycle power generation. At three proposed sites (North Dakota, New Mexico, and Wyoming), complete water requirements and effluents, including all mining and related offsite uses, are given for the power, Hygas, and Solvent Refined Coal process plants. The synthane process is analyzed only at the Wyoming site. Analyses of influent and effluent water, with examples for study, are also given. For the three selected plants at the North Dakota site, source water of good quality is assumed to be cheap and available. For the New Mexico plants, source water will be available but is brackish. All the Wyoming site plants will receive sewage from a satellite town, and additional fresh water is available but is assumed to be expensive. The plants, being net consumers of water, are designed for no discharge of water. For each process at each site (10 cases) an integrated water treatment plant block flow diagram is given with approximate costs and energy requirements. The appendix contains results of analyses of wastewater samples. (Wares-IPA)
W78-03685

DISPOSAL OF COAL PREPARATION WASTES: ENVIRONMENTAL CONSIDERATIONS,
Los Alamos Scientific Lab., NM.
For primary bibliographic entry see Field 5E.
W78-03686

ASBESTOS FIBERS IN DISCHARGES FROM SELECTED MINING AND MILLING ACTIVITIES. FINAL REPORT PART III,
McCrone (Walter C.) Associates, Inc., Chicago, IL.
For primary bibliographic entry see Field 5A.
W78-03687

A LEGAL ORDER FOR THE OCEANS, II,
For primary bibliographic entry see Field 6E.
W78-03691

HOLLINGS CALLS FOR DEPARTMENT OF ENVIRONMENT AND OCEANS,
Senate, Washington, DC.
For primary bibliographic entry see Field 6E.

W78-03692

ENVIRONMENTAL RESEARCH OUTLOOK (FY 1977 THROUGH FY 1981).
Environmental Protection Agency, Washington, DC. Office of Research and Development.
Report No. EPA-600/9-77-002, February 1977. 194 p.

Descriptors: *Research and development, *Research priorities, *Comprehensive planning, *Projects, Public health, Planning, Social aspects, Ultraviolet radiation, Economic impact, Resources, Research facilities, Research equipment, Technology, Laboratories, Multiple-purpose projects, Administrative agencies, Federal government, Pollutants, Water supply, Industries, Energy, Conservation, Toxicity.

The purpose of the annual summary of environmental research activities, priorities, and trends prepared by the Office of Research and Development (ORD) is to present a flexible research plan to support the Environmental Protection Agency's mission of protecting and enhancing the quality of the environment. The plan is supplemented by a series of more detailed reports which highlight past accomplishments and describe research focused on current environmental issues. The organizational structure of ORD is explored and compared to the program structure of the agency's activities. In addition, considerations involved in the establishment of priorities and the trends and options within the agency are discussed. Numerous tables and figures are utilized to illustrate these aspects of ORD operations. Finally, the fourteen subprograms of ORD, particularly health effects studies and energy research, are examined in detail. (Moorhouse-Florida)
W78-03695

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMAL SCHEDULING OF WATER SUPPLY PROJECTS,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 4A.
W78-03241

MATHEMATICAL METHODS FOR USE IN PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03420

MIXED INTEGER PROGRAMMING MODELS FOR WATER RESOURCES MANAGEMENT,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W78-03421

STOCHASTIC MODELS FOR RESERVOIR DESIGN,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 4A.
W78-03631

URBAN STORMWATER MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03632

MODELS FOR SCHEDULING RELEASES FROM MULTIRESERVOIR SYSTEMS: A STATE-OF-THE-ART REVIEW,
Acres Consulting Services Ltd., Niagara Falls (Ontario).
For primary bibliographic entry see Field 4A.
W78-03637

6B. Evaluation Process

WATER RESOURCE PLANNING AND RURAL WATER SYSTEMS,
For primary bibliographic entry see Field 6E.
W78-03371

MATHEMATICAL METHODS FOR USE IN PLANNING REGIONAL WASTEWATER TREATMENT SYSTEMS,
Illinois Univ. at Urbana-Champaign. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03420

MIXED INTEGER PROGRAMMING MODELS FOR WATER RESOURCES MANAGEMENT,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W78-03421

A STUDY OF FEASIBILITY OF STATE WATER USER FEES FOR FINANCING WATER DEVELOPMENT,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 6C.
W78-03425

DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982, (FINAL DRAFT).
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 278, Price codes: A08 in paper copy, A01 in microfiche. Submitted to Office of Science and Technology Policy, Washington, D. C., April 1977. 138 p, 2 fig, 9 tab, 53 ref, 4 append.

Descriptors: *Water resources research(US), *Research and development, *Future planning(Projected), Projections, Planning, Water policy, *Federal project policy, *Project planning, *Research projects, Expenses, Economics.

This report analyzes the effectiveness of the 10-year program of water resources research (1965-75), sets forth a perspective for the role that water resources must play in the U. S., and identifies issues in which water is a vital consideration. The Committee on Water Resources Research (COWRR) attempted to re-focus the needed program in water research for at least the next five years. An objective, defensible analysis of the criticalnational water problems is presented, which involves the delineation of water resources questions of national interest, and identifies the deficiencies in knowledge and understanding which must be eliminated. COWRR recommends that the Administration and Congress take immediate steps to restore the program by 1978 to the equivalent level of support it had in 1971 at least, and develop plans to increase the support by 1982 to the level of effort recommended by the Committee in its 1966 report. The Congress and the Administration are also urged to increase their efforts to formulate and implement a unified national program of water resources research that integrates and balances the research activities of the Federal agencies in support of clearly expressed national goals and objectives. The mission agencies are requested to maintain a balanced in-house and extramural research program that includes industry and consultants as well as the universities to ensure a continued supply of appropriately trained graduates. A thorough manpower needs study should be undertaken for the broad spectrum of the water resources field to assess the supply and demand that is likely to occur over the next decade. Federal agencies are admonished to give careful attention in design of their research progrms and budget requests to these important areas. The Interdepartmental Committee on Atmospheric Sciences should be informed of COWRR's strong support in the efforts of ICAS to consider and coordinate Federal atmospheric and climatic research programs. (OWRT)
W78-03428

DATA EVALUATIONS AND RECOMMENDATIONS FOR COMPREHENSIVE PLANNING FOR THE YAZOO RIVER BASIN, MISSISSIPPI,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 4A.
W78-03473

RESERVOIR PLANNING AND OPERATION,
Harvard Univ., Cambridge, MA. Dept. of Engineering and Applied Mathematics.
For primary bibliographic entry see Field 4A.
W78-03630

OUTLET DRAINAGE - AN ASSESSMENT OF ENVIRONMENTAL EFFECTS,
Waterloo Univ. (Ontario). Dept. of Geography.
J. C. Day, R. F. Brady, and M. J. Staite.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference, University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 445-460, 1976. 1 fig, 3 tab, 28 ref.

Descriptors: *Outlets, *Drainage, Effects, *Projects, *Cost-benefit analysis, *Project planning, Assessment, *Environmental effects, Basins, Water management(Applied), Reservoirs, Agriculture, Cost analysis, Cost-benefit ratio, Economic feasibility, *Dundalk Plateau(Ontario), Land drainage, Cost distribution, Canada.

At present, most research concerning drainage impacts generally examines isolated parts of the environment. Available data are fragmentary, specialized, and elusive. During the past two years, a research group at the University of Western Ontario and the University of Waterloo studied environmental impacts of an outlet drainage project in the Dundalk Plateau, Ontario. Events which led to adoption of the drainage scheme suggest that an independent assessment of outlet drainage, or channelization, projects could increase the sensitivity of excavation practices, prevent needless environmental impairment, and raise the social utility of such undertakings. This paper begins with an assessment of the literature concerning impacts of outlet drainage in Ontario. This is followed by a description of the study area and an analysis of the engineers' reports which constitute the technical rationale for the project. Finally, conclusions concerning the social merit of the undertaking are presented based on benefit-cost analyses, field observation and local residents' perceptions of the project merit. Extreme discrimination in the allocation of benefits among basin residents, the undesirable ecological consequences, and the enormous economic losses associated with this project point to an immediate need in Ontario for an independent body to assess the full range of outlet drainage consequences. (Bell-Cornell)
W78-03640

ECONOMIC ANALYSIS OF WATER-SAVING TECHNIQUES IN IRAN,
Florida Univ. Gainesville. Dept. of Food and Resource Economics.
For primary bibliographic entry see Field 3F.
W78-03644

OWNERSHIP AND WATER SYSTEM OPERATION,
West Virginia Univ., Morgantown. Dept. of Economics.
For primary bibliographic entry see Field 6C.
W78-03647

ECONOMIC FEASIBILITY OF IRRIGATING SOUTHERN PINES,
Wisconsin Univ.-Parkside, Kenosha. Div. of Social Sciences.
For primary bibliographic entry see Field 3F.
W78-03652

CANADA COMMITTEE ON ECOLOGICAL (BIO-PHYSICAL) LAND CLASSIFICATION, WORKING GROUP ON LAND/WATER INTEGRATION, PROCEEDINGS OF THE FIRST MEETING, FEBRUARY 17-18, 1977, FRESHWATER INSTITUTE, WINNIPEG, MANITOBA.
Department of the Environment, Hull (Quebec). Lands Directorate.
For primary bibliographic entry see Field 6G.
W78-03653

A SELECTED ANNOTATED BIBLIOGRAPHY OF ECONOMIC VALUES OF FISH AND WILDLIFE AND THEIR HABITATS,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
J. A. Leitch, and D. F. Scott.
Agricultural Economics Miscellaneous Report No. 27, August 1977. 132 p.

Descriptors: *Economics, Evaluation, *Wildlife, *Fish, *Bibliographies, *Wildlife habitat, Wetlands, Recreation, *Wetland economics.

A total of 691 entries are organized into the following categories: (1) wetland economics (111 entries), (2) economics of fish and wildlife and their habitats (215), (3) evaluation techniques with application to fish and wildlife (40), (4) socioeconimic characteristics of hunters and fishermen (43), (5) outdoor recreation economics (138), (6) natural resource economics (55), (7) water resource economics related to fish and wildlife (68), (8) bibliographies (21). (Stihler-Mass)
W78-03660

IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM, TUCSON, ARIZONA, JULY 9, 1977.
For primary bibliographic entry see Field 4C.
W78-03661

COASTAL RECREATION RESOURCES IN AN URBANIZING ENVIRONMENT, SYMPOSIUM, HYANNIS, MASSACHUSETTS, APRIL 12-14, 1976.
Extension Service, University of Massachusetts, Amherst, August 1977. 129 p. $3.00.

Descriptors: *Wetlands, *Recreation, *Water quality, *Water injury, *Water policy, *Environmental effects, *Recreation wastes, *Social aspects, *Recreation demand, *Water resources development, *Shores, Coastal marshes, Land reclamation, Wildlife conservation, Fish management, Fishing, Boating, Beaches, Sport fishing, Recreation facilities, Marinas, Waste disposal, Cities, Urban sociology, Aesthetics, Commercial fishing, Coastal recreation, Coastal zone management.

This monograph emphasizes coastal resource values and examines the public and private roles, including special interest groups, in coastal recreation management; utilization of living resources--finfish, shellfish and wildlife; and utilization of physical resources--tidal water, wetlands and shorelines. Papers examine these resource descriptions, with regard to defining uses and values, problems of descriptions, and identifying conflicts, management and research needs. A broad array of coastal resources and their attendant values are the focus of a growing local, state, and natioal interest in preserving the nation's coasts. Many of these resources and values are unique, fragile and are subject to ever increasing pressures for use and modification. However, once coastal resources are altered or destroyed, the loss is generally irreparable for coastal communities and the people who benefit from the resources. (Steiner-Mass)
W78-03662

DEVELOPMENT OF WATER RESOURCES IN APPALACHIA.
Corps of Engineers, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A037 332, Price codes: A06 in paper copy, A01 in microfiche. WRA Main Report, Part I, Volume 2, Map Folio, 1969. 63 p.

Descriptors: *Maps, Water resources, *Water resources development, *Appalachian mountain region, Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia, Bodies of water, Projects.

Maps illustrating existing water development to 1980 and future plan elements for water resources in Appalachian areas of the United States are presented. The maps show all existing bodies of water (creeks, lakes, reservoirs, and rivers) and recommended projects (including watersheds, flood plains, locks and dams, channel improvements, and impoundments). The map illustrate such data for Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennesse, Virginia, and West Virginia. (Wares-IPA)
W78-03675

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ECONOMIC ANALYSIS OF INDUSTRIAL INCENTIVES FOR POLLUTION CONTROL: IMPLICATIONS FOR WATER QUALITY.
ABT Associates, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03328

FINANCING AND COST SHARING MUNICIPAL WATER SUPPLY SYSTEMS,
Georgia Univ., Athens. Inst. of Natural Resources.
R. M. North.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 662, Price codes: A03 in paper copy, A01 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC 06-77, June, 1977. 32 p, 8 tab, 5 ref. OWRT B-092-GA(1), 14-31-0001-4149.

Descriptors: *Financing, *Cost sharing, Financial feasibility, Economic feasibility, Cities, *Municipal water, Benefit pricing, *Water supply systems.

The sources of financing for municipal water supply come largely from the private sector but the proportions are shifting heavily to Federal loans and grants, especially for small systems. These small systems have excellent abilities to amortize capital costs of most water supply systems by charging reasonable service fees or prices. Selected municipalities may sometimes benefit from direct Federal investments in multiple purpose water control projects by purchasing water supply rights from Federal impoundments. However, this is not a major source of financing generally available to municipalities. When Federal programs and projects are considered independently of those municipal water supply systems financed without any Federal involvement, the Federal contribution to total project cost is 36 percent Nationally but only 14 percent in the South Atlantic Gulf Region. However, all municipalities--those receiving Federal sources of financing and those financing in the private capital markets--must generate repayment funds from pricing the water services to users by levying special assessments or by including provisions in general taxing authority sufficient to amortize loans and bonded indebtedness over appropriate periods of time. In general, municipalities of all sizes in Georgia were found to have an opportunity to sell water supply services for moderate prices and generate sufficient revenue to amortize all investment costs. Such communities are in great need of pricing and other technical assistance to acquire private sector funds for their water supply systems.
W78-03419

A STUDY OF FEASIBILITY OF STATE WATER USER FEES FOR FINANCING WATER DEVELOPMENT,
Utah Center for Water Resources Research, Logan.
D. H. Hoggan, O. W. Asplund, J. C. Andersen, and D. G. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 702, Price codes: A05 in paper copy, A01 in microfiche. Utah Water Research Laboratory Publication PRWG162-2, September 1977. 94 p, 12 fig, 17 tab, 50 ref, 7 append. OWRT B-122-UTAH(2), 14-31-0001-5121.

Descriptors: Water resource development, *Pricing, *Financing, State governments, *Feasibility studies, Water utilization, *Water users, *Use rates, Costs, Water costs, *Utah.

Water user fees imposed by a state on major water uses is a possible new alternative source of state water development funds. Only in the area of water based recreation have states extensively employed user fees to defray management and operating expenses. The 'user pay' theory indicates that user fees would be an economically more efficient and equitable source for financing water development than general tax revenues. In the design of fee structures for major water uses, several characteristics of fees are appropriate to consider. Five which were identified in this study are: equity, economic efficiency, allocational effectiveness, administrative simplicity, and revenue generating potential. These rate design considerations may relate only indirectly to a state system of user fees since the state fees envisioned in this study in many cases may be only an add-on or surcharge to a basic charge imposed by a local entity, such as a municipality or an irrigation district. Revenue generating potential was of primary interest in this study. Estimates of revenue potential for four major water uses--irrigation, municipal, industry, and recreation--were made with a formula developed for this purpose. Results indicate that some fee alternatives probably could be implemented by administrative action; others would require legislative approval. Constitutional issues related to some alternatives would have to be resolved by the state supreme court.
W78-03425

ECONOMIC ANALYSIS OF WATER-SAVING TECHNIQUES IN IRAN,
Florida Univ. Gainesville. Dept. of Food and Resource Economics.

For primary bibliographic entry see Field 3F.
W78-03644

INCOME AND PRICE ELASTICITIES OF DEMAND FOR WATER IN DEVELOPING COUNTRIES,
Harvard Univ., Cambridge, MA. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 6D.
W78-03645

OWNERSHIP AND WATER SYSTEM OPERATION,
West Virginia Univ., Morgantown. Dept. of Economics.
P. C. Mann, and J. L. Mikesell.
Water Resources Bulletin, Vol. 12, No. 5, p 995-1004, October 1976. 3 tab, 9 ref.

Descriptors: *Water costs, *Regulation, *Regression analysis, *Cost analysis, Governments, Operating costs, Water supply, Equations, *Water utilities regulation, Private ownership, Municipal ownership, Literature review, Empirical analysis.

Two types of organizational systems provide most of the water service in the United States. The investor-owned firm operates on a profit basis generally subject to state commission regulation. The government-owned firm is generally confronted by local control. The comparative efficiency of private versus government firm provision of water services is essentially an empirical issue. Unit costs and other operating statistics are examined for water firms of each ownership form. This analysis shows that private firms tend to have higher operating costs than do government firms, possibly attributable to wage-salary differentials. Indicated also is that capital investment in large government firms may result in diseconomies. The analysis creates serious doubt as to whether or not efficient provision of water services can be better facilitated by large mergers of either ownership form. (Bell-Cornell)
W78-03647

INEQUITIES FOR SMALL FOOD PROCESSING PLANTS RESULTING FROM LIQUID WASTE TREATMENT REGULATIONS,
Teepak, Inc., Danville, IL.
For primary bibliographic entry see Field 5G.
W78-03648

6D. Water Demand

OPTIMAL SCHEDULING OF WATER SUPPLY PROJECTS,
Technical Univ. of Denmark, Copenhagen. Inst. of Hydrodynamics and Hydraulic Engineering.
For primary bibliographic entry see Field 4A.
W78-03241

INCOME AND PRICE ELASTICITIES OF DEMAND FOR WATER IN DEVELOPING COUNTRIES,
Harvard Univ., Cambridge, MA. Dept. of City and Regional Planning.
M. T. Katzman.
Water Resources Bulletin, Vol. 13, No. 1, p 47-55, February 1977. 6 tab, 20 ref.

Descriptors: *Water demand, *Pricing, *Investment, Income analysis, Domestic water, Forecasting, Estimating, Time series analysis, Mathematical models, Households, Linear model, Economic analysis, Developing countries, *Malaysia(Penang Island).

The income and price elasticity of demand for domestic water is estimated for Penang Island, Malaysia. A cross-sectional analysis of a random sample of 1400 households indicates an income-elasticity of zero for low-income families (per capita income less than U.S. $300) and an elasticity of 0.2-0.4 for higher-income families. A time-series analysis of a subsample of individuals of varying income levels suggests a short-run price elasticity of -0.1 to -0.2. The implications of these results for demand forecasting are discussed. It is concluded that demand projections which take into account income and price elasticities are more sensitive to changes in policy, such as pricing, than traditional engineering approaches. (Bell-Cornell)
W78-03645

WATER CONSUMPTION IN SMALL COMMUNITIES OF NORTHEAST THAILAND,
Asian Inst. of Tech., Bangkok, Thailand.
R. J. Frankel, and P. Shouvanavirakul.
Water Resources Research, Vol. 9, No. 5, p 1196-1207, October 1973. 6 fig, 5 tab, 3 ref.

Descriptors: *Water demand, *Design criteria, *Rural areas, Water requirements, Water distribution(Policy), Pricing, Daily, Seasonal, Effects, Water quality, Water policy, *Water consumption, *Thailand, Developing countries, Rainwater, Water availability, Socioeconomic status.

Water consumption in 14 rural communities of northeast Thailand was studied to determine water needs and to delineate the factors that affect water use. For 13 of these communities, average daily water consumption ranged from 10 to 90 l/cap/day (liters per capita per day). In one village with free water distributed through house connections 24 hr/day, water usage ranged from 115 to 160 l/cap/day. Water consumption was significantly influenced by the season of the year, limited hours of availability of water through the distribution system, type of water service connection, and by price of water for metered house connections only. Design criteria for maximum daily and maximum hourly water demands were found to be 1.5 and 4 times the average daily water consumption, respectively. The data collected reflect initial water use values in villages where water systems are only a few years old. (Bell-Cornell)
W78-03651

DEVELOPMENT OF WATER RESOURCES IN APPALACHIA.
Corps of Engineers, Cincinnati, OH.
For primary bibliographic entry see Field 6B.
W78-03675

6E. Water Law and Institutions

THE COMING WATER FAMINE,
House, Washington, DC.
For primary bibliographic entry see Field 3B.
W78-03324

POLLUTION AND INDUSTRIAL WASTE.
For primary bibliographic entry see Field 5G.
W78-03325

DEATH OF THE SWEET WATERS,
For primary bibliographic entry see Field 5G.
W78-03326

THE INDUSTRY/EPA CONFRONTATION (LIVING TODAY WITH THE WPCA AMENDMENTS OF 1972),
Centec Consultants, Inc., Reston, VA.
For primary bibliographic entry see Field 5G.
W78-03327

ECONOMIC ANALYSIS OF INDUSTRIAL INCENTIVES FOR POLLUTION CONTROL: IMPLICATIONS FOR WATER QUALITY.
ABT Associates, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03328

WATER QUALITY MANAGEMENT PLANNING: THE FATE OF 208,
Cook Coll., New Brunswick, NJ. Environmental Law.
For primary bibliographic entry see Field 5G.
W78-03330

EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE FOR NEW SOURCES.
National Field Investigations Center-Denver, CO.
For primary bibliographic entry see Field 5G.
W78-03331

EMERGING RIGHTS FOR OWNERS OF SUBSIDED LANDS (COMMENT ON COASTAL INDUSTRIAL WATER AUTHORITY V. YORK),
A. H. Conlan.
Southwestern Law Journal, Vol 30, No 5, p 943-50, Winter 1976.

Descriptors: *Navigable waters, *Riparian land, *Riparian rights, *Subsidence, *Erosion, Water table, Gulf of Mexico, Legal aspects, Judicial decisions, Legal review, Accretion(Legal aspects), Avulsion, Submergence, Land subsidence, Groundwater, Soil water movement, Water levels, Sea level, Sea water, Gulf Coastal Plain.

The first reported case to consider the effect of subsidence upon riparian boundaries determined that a riparian landowner does not lose title to portions of his land which, in the absence of any evidence of erosion, have gradually subsided beneath navigable coastal waters. By this decision the court limited the applications of the doctrines of avulsion, accretion, erosion, and reliction and extended the rule of submergence in situations involving subsidence of coastal land. The result implicitly recognizes the hazards of ownership of coastal property and is significant in that it makes clear that changes in riparian boundaries caused by third parties over which the riparian owner has no control will be viewed in the same light as changes resulting from natural phenomena. The court noted that the holding may not apply to land adjacent to waters affected by tides, thus leaving its application to the Gulf Coast region uncertain. The author concludes that the decision creates a new standard for riparian boundaries and suggests a potential for future conflict in its application to submerged lands actually used for public navigation. (Mulligan-Florida)
W78-03332

EFFECTIVE NATIONAL REGULATION OF POINT SOURCES UNDER THE 1972 FEDERAL WATER POLLUTION CONTROL ACT: THE DOUBLE BURDEN OF LEGISLATIVE DRAFTMANSHIP AND JUDICIAL REVIEW,
For primary bibliographic entry see Field 5G.
W78-03333

LIABILITY, COMPENSATION AND PREVENTION OF OIL SPILLS: A NORTH AMERICAN PERSPECTIVE,
Lewis and Clark Co., Portland, OR. Northwestern School of Law.
For primary bibliographic entry see Field 5G.
W78-03335

THE UNITED NATIONS ENVIRONMENT PROGRAM: THE MEDITERRANEAN CONFERENCES,
D. DeHoyos.
Harvard International Law Journal, Vol. 17, No. 3, p. 639-49, Summer 1976.

Descriptors: *United Nations, *Planning, *Oceans, *Water pollution control, Foreign projects, Marine biology, Oil pollution, Project planning, Political aspects, International waters, Foreign countries, Foreign waters, Governments, Sea water, Water quality control, Water resources development, International law, Research and development, Ships, Europe, Africa, Coasts, Water disposal, International commissions, Monitoring.

Under the sponsorship of the United National Environmental Program (UNEP), the states bordering the Mediterranean have formulated an action plan, a convention, and two protocols to combat the problem of pollution of the Mediterranean Sea. The expansion of population and economic activities in coastal areas has significantly aggravated Mediterranean pollution. UNEP has given regional ocean pollution a high priority holding regional conferences for the Mediterranean in Barcelona in 1975 and 1976 to draft pollution control agreements. The author discusses the Barcelona agreements and evaluates them as a means of protecting the marine environment and as example of functional cooperation. The 1975 Conference Action Plan provided for scientific research through a coordinated pollution monitoring and research program consisting of seven marine pollution pilot research projects. In addition, a program was initiated to reconcile controversies between proponents of economic progress and environmental protection. The 1976 conference adopted a convention and two protocols to control pollution of the Mediterranean. If national policies and practices can be adapted to regional standards, the Mediterranean may become a model of regional cooperation with regional pollution control a viable alternative to national or global pollution control. (Yawn-Florida)
W78-03336

ENVIRONMENTAL REGULATION OF OFFSHORE EXPLORATION, PRODUCTION, AND DEVELOPMENT,
Atlantic Richfield Company, Anchorage, AK.
For primary bibliographic entry see Field 5G.
W78-03337

ENVIRONMENTAL PROBLEMS ONSHORE,
Shell Oil Co., Houston, TX. Corporate Law Dept.
For primary bibliographic entry see Field 5G.
W78-03338

ALASKA PIPELINE--FINANCIAL RESPONSIBILITY FOR OIL SPILLS.
Federal Maritime Commission, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03340

SHORE AND BEACH MANAGEMENT IN LOUISIANA,
Louisiana Coastal Commission, Layfayette.
For primary bibliographic entry see Field 2L.
W78-03341

NORTH CAROLINA COASTAL ZONE MANAGEMENT ACT,
North Carolina State Dept. of Administration, Raleigh. Office of Marine Affairs.
For primary bibliographic entry see Field 2L.
W78-03342

OIL POLLUTION LIABILITY LEGISLATION TRANSMITTED TO THE CONGRESS,
For primary bibliographic entry see Field 5G.
W78-03343

THE URBAN WATERFRONT: OPPORTUNITIES FOR RENEWAL,
New York Univ., NY. Graduate School of Public Administration.
For primary bibliographic entry see Field 2L.
W78-03344

PETROLEUM REFINING POINT SOURCE CATEGORY PRETREATMENT STANDARDS FOR EXISTING SOURCES EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03346

TEXTILE INDUSTRY POINT SOURCE CATEGORY EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03347

ISSUES INVOLVED IN UNITED STATES BEACH PRESERVATION AND PROTECTION PROGRAMS,
Cook Coll., New Brunswick, NJ.
For primary bibliographic entry see Field 2L.
W78-03348

NORTHERN ST. JOHNS COUNTY COASTAL MANAGEMENT PLAN,
Florida Coastal Engineers, Inc., Jacksonville.
For primary bibliographic entry see Field 6F.
W78-03349

CHANNEL MODIFICATION GUIDELINES.
Soil Conservation Service, Washington, DC.
For primary bibliographic entry see Field 4A.
W78-03350

FINANCIAL RESPONSIBILITY FOR OIL POLLUTION, ALASKA PIPELINE.
Federal Maritime Commission, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03351

WATER RESOURCE POLICY STUDY.
Water Resources Council, Washington, DC.
Federal Register, Vol. 42, No. 136, p. 36788-95, July 15, 1977. 1 tab.

Descriptors: *Federal government, *Interagency cooperation, *Water quality, *Water conservation, *Water supply development, Administrative agencies, Natural resources, Water allocation(Policy), Water control, Water costs, Water distribution(Applied), Water law, Water management(Applied), Water resources, Water reuse, Water rights, Water utilization.

President Carter has directed the Secretary of the Interior, as Chairman of the Water Resource Council, together with the Office of Management and Budget and the Council on Environmental Quality, to conduct a comprehensive review of federal water resources policy. The review is to be completed within six months and will lead to the establishment of a national resources policy emphasizing sensitive and cost efficient management. Eight regional hearings have been scheduled and four papers have been published to facilitate comments and ideas. The first paper deals with revision of the planning and evaluation criteria of the federal departments and independent agencies concerned with water resource planning. The second paper studies the existing policies governing federal and non-federal cost sharing arrangements, and suggests how they may be made consistent with each other. The third paper examines existing and alternative water resources related institution, and promotes more efficient and equitable water use. The fourth paper concerns the adverse effect upon conservation of: a lower-than-cost price for water, inadequate watershed management practices, the limited recycling of water and inefficient use of water. (Jordan-Florida)
W78-03352

RESERVED WATER RIGHTS - A SOLUTION IS NEEDED,
Idaho Dept. of Water Resources, Boise.
R. K. Higginson.
Journal of the American Water Works Association, Vol. 68, No. 3, p. 129-31, March 1976. 11 ref.

Descriptors: *Federal-state water rights conflicts, *Reservation doctrine, *Water rights, *Prior appropriation, Federal jurisdiction, National forests, Legal aspects, Jurisdiction, Boundary disputes, Natural resources, Water law, Riparian rights, Indian reservations, Competing uses, Natural use, Rivers, Preferences(Water rights), Legislation, Navigable waters.

Although it is indisputable that the federal government has prior appropriation rights to water within the country, the nature and extent of these rights is a source of controversy. It is unclear whether the federal claim is limited to the uses contemplated when the reservation was created or if the claim can encompass present day considerations. The federal government claims its reserved water rights include all of the water within the exterior boundary of the reservation and that, in addition to those uses specifically detailed in the Forest Organic Act of 1897, the uses for which the water was set aside include fish passage, aesthetic beauty, wildlife protection and recreation. The author believes that a careful reading of the Act shows the government's rights to be much narrower than this claim. He also questions the Indian's rights to water. In an attempt to end the controversy, the Department of Justice has drafted a bill for quantification, identification and adjudication of federal reserved and other water rights. The author discusses the objections to this bill and outlines the elements necessary in any bill which seeks the states' support. (Maass-Florida)
W78-03353

THE FIGHT TO SAVE HAWAII'S SHORELINES,
For primary bibliographic entry see Field 2L.
W78-03354

FEDERAL-STATE WATER RIGHTS CONFLICTS,
Arizona Univ., Tucson. School of Law.
R. E. Clark.
Journal of the American Water Works Association, Vol. 68, No. 3, p. 123-28, March 1976. 90 ref.

Descriptors: *Federal-state water rights, *Water rights, *Water allocation(Policy), *Prior appropriation, *Reservation doctrine, Water policy, Water demand, Judicial decisions, Legislation, Water resources development, Federal project policy, Water resources, Water supply, Groundwater resources, Water supply development, Water utilization, State jurisdiction, Federal jurisdiction, Withdrawn lands, Federal reservations, Indian reservations.

The federal-state water rights conflict in the Western states affects federal programs such as reclamation, Indian rights, water augmentation, and flood control. The author traces the historical development of water rights with frequent references to case law and legislation. The Western prior appropriation system views water supply as a public resource. Private rights are acquired by actual beneficial use and are separate from land ownership. Although Western states unanimously recognize appropriative rights to surface water, groundwater law is unclear. Federal claims to implied reserved water rights arise from Indian reservations and from land withdrawn by

the federal government for forest, oil, and military reserves. Legislation is annually proposed but unsuccessful in providing for the superiority of state water rights over any except Indian implied reserved rights. Three approaches suggested for resolving the conflict are: (1) a Congressional bill subordinating federal water rights to state law; (2) an inventory of federal water rights to be related to private rights under state law; and (3) maintaining the status quo, continuing water adjudication on a case by case basis. (Mulligan-Florida)
W78-03355

JUDICIAL MAELSTROM IN FEDERAL WATERS: A COMPOSITE INTERPRETATION OF THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972,
For primary bibliographic entry see Field 5G.
W78-03356

INDIAN CLAIMS IN THE BEDS OF OKLAHOMA WATERCOURSES,
M. M. Gibson.
American Indian Law Review, Vol. 4, No. 1, p. 83-90, Summer, 1976.

Descriptors: *Oklahoma, *River beds, *Indian reservations, *Ownership of beds, Banks, Navigable rivers, Legal aspects, Federal government, Beds under water, Boundaries(Property), Riparian rights, State governments, Judicial decisions, Legal review, Boundary disputes, Adjacent land owners, Water law, Streambeds, Land tenure, Treaties, Watercourses(Legal aspects).

Four main Supreme Court cases provide the principles under which Indian claims in the beds of Oklahoma watercourses are to be determined. First, treaties with Indians are to be construed in their favor. Second, the fact that a river is navigable does not necessarily deny Indian ownership of the bed provided the Indians had a possessory interest in the river before Oklahoma became a state. Third, the language of the treaty placing the Indians on a particular tract controls. Fourth, the words 'up', 'down' and 'main channel' are words of art and have specific meanings. Fifth, the phrase 'to and along the bank' clearly implies no intent to transfer any ownership in the bed. Sixth, the ownership in fee of land bordering a watercourse is not a requisite of a legitimate claim to the river bed. Finally, mineral ownership to the upland carries with it mineral rights in the river bed. (Moorhouse-Florida)
W78-03357

ONSHORE IMPACT OF OFFSHORE DRILLING: THE POLICE POWER ALTERNATIVE,
For primary bibliographic entry see Field 5G.
W78-03358

WATER RIGHTS IN THE COAL FIELDS OF THE YELLOWSTONE RIVER BASIN,
Bureau of Indian Affairs, (Washington, DC.).
W. H. Veeder.
Law and Contemporary Problems, Vol. 40, No. 1, p. 77-96, Winter, 1976.

Descriptors: *Water rights, *Water supply, *Water sources, *Coals, *Strip mines, Indian reservations, Montana, Wyoming, Reservation doctrine, Prior appropriation, State governments, Federal government, Legal aspects, Public lands, Planning, Future planning(Projected), Project planning, Legislation, Regional development, River basin development, Social aspects, Water allocation(Policy), Governmental interrelations, Federal-state water rights conflicts.

The Yellowstone River Basin contains thirty-four billion tons of strippable coal deposits. However, its accessibility depends upon proper resolution to conflicting federal, state and Indian claims regarding the distribution of water resources in the area. Indian claims to the water resources stem from treaties entered into with the early European explorers and subsequently ratified by treaties with the United States. Montana and Wyoming, the states composing the Yellowstone River Basin, adhere to the Western Water Law theory that one may appropriate all water passing upon his property provided beneficial use is made of it. State and federal government conflicts center around whether the federal government has delegated to the states the power to regulate the use of water on federal and Indian lands by virtue of statutes permitting appropriations according to state laws and, absent specific delegation, to what extent states may exercise regulatory control over waters that pass through their jurisdictions. Plans for developing coal-related industries in the Yellowstone River Basin should take into account the highly fluctuating water supplies and the needs of those already holding vested water rights. Mistakes in these estimates may prove disastrous for residents. (Moorhouse-Florida)
W78-03359

UPPER MISSOURI REGION, FISCAL YEAR 1974.
Bureau of Reclamation, Washington, D.C.
1975, 26 p.

Descriptors: *Reclamation states, *Reclamation, *Irrigation programs, *Dam construction, Recreation, Wyoming, Soil erosion, Recreation facilities, Agriculture, Irrigation districts, South Dakota, North Dakota, Montana, Irrigation, Irrigation design, Irrigation engineering, Irrigation systems, Dams, Flood control, Drainage, Drainage systems.

The Bureau of Reclamation has numerous reclamation projects underway in the Upper Missouri Region. These projects are summarized along with reports on construction, progress, land acquisition activity, power system operations, water and land operations and planning for future projects. Major projects in North and South Dakota and Wyoming consist of dams and reservoirs to aid irrigation and to supply energy and recreational benefits. A dust abatement program has been developed in Montana. The Bureau's progress in the areas of water delivery systems, safety of dams, irrigation management, drainage, flood control, soil and moisture conservation, recreation, fish and wildlife management, industrial water marketing, crip values, and cultural resource surveys including archaelogical and historical work is also discussed. Proper reclamation planning for the conservation and development of water involves consideration of the environmental and economic objectives, and also of the effects on regional development and public welfare. (Denker-Florida)
W78-03360

PRETREATMENT STANDARDS FOR EXISTING SOURCES AND NEW SOURCES OF POLLUTION (PROPOSED REGULATIONS FOR 21 INDUSTRIES).
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03361

THE TOWN DILEMMA (P.C.B.'S IN BLOOMINGTON, INDIANA),
For primary bibliographic entry see Field 5G.
W78-03362

STATE BOARD ADOPTS COMPREHENSIVE ACTION PLAN (WASTEWATER RECLAMATION),
For primary bibliographic entry see Field 5G.
W78-03363

STATE UNDERGROUND INJECTION CONTROL PROGRAMS.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03364

WATER PROGRAMS: SECONDARY TREATMENT INFORMATION (PROPOSED RULES).
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03365

BIOCHEMICAL OXYGEN DEMAND, SUSPENDED SOLIDS AND PH (SECONDARY TREATMENT INFORMATION).
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03366

THE DEVELOPMENT OF THE CALIFORNIA AND FEDERAL WATER POLLUTION CONTROL PROGRAMS,
For primary bibliographic entry see Field 5G.
W78-03367

BALANCING OF INTEREST AND INTERNATIONAL LIABILITY FOR THE POLLUTION OF INTERNATIONAL WATERCOURSES: CUSTOMARY PRINCIPLES OF LAW REVISITED,
Yale Univ., New Haven, CT. Yale Law School.
For primary bibliographic entry see Field 5G.
W78-03368

FINAL REVISION OF REGULATIONS AND CRITERIA FOR OCEAN DUMPING.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-03369

PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS FOR NEW SOURCE NPDES PERMITS.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 6G.
W78-03370

WATER RESOURCE PLANNING AND RURAL WATER SYSTEMS,
W. Ellingson, and R. Oostra.
South Dakota Law Review, Vol. 19, No. 3, p. 622-640 (Summer 1974). 50 ref.

Descriptors: *Water allocation(Policy), *Water resources development, *Iowa, *South Dakota, *Comprehensive planning, Planning, Long-term planning, Administration, Decision making, Forecasting, Governments, State governments, Administrative agencies, Legislation, Governmental interrelations, Management, Regional development, Social aspects, Water management(Applied), Competing uses, Future planning(Projected).

The majority of this nation's water resource problems do not stem from an overall lack of water but rather a lack of accommodation between natural water distribution patterns and man's need patterns. Consequently, water resource planning on a regional and statewide basis is of utmost importance. The authors examine the development of a rural water distribution system in northwest Iowa. Special emphasis is placed on the lack of regional or statewide water resource planning at all decision making levels. The federal, state and local laws and regulations applicable to the system are outlined. Iowa and South Dakota statutory provi-

sions for water resource planning and control are compared and analyzed in relation to the Model Water Code for comprehensive water resource planning. The case study demonstrates problems encountered at both the state and federal levels due to the absence of set procedures and general resource development plans. Indeed, the sum result of the procedures examined was delay and lack of knowledge concerning environmental impact. Existing state statutes merely encourage water use planning rather than demand it. What is needed is mandatory water use planning as outlined in the Model Water Code. (Moorhouse-Florida)
W78-03371

EXISTING REMEDIES FOR WATER POLLUTION,
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 5G.
W78-03372

SALT WATER INTRUSION IN FLORIDA (LEGAL APPROACHES TO PREVENTION AND CONTROL),
Florida Univ., Gainesville. School of Law.
For primary bibliographic entry see Field 5G.
W78-03373

THE RIGHT OF AN INDIVIDUAL TO COMPENSATION FOR DAMAGES DONE TO HIS RIGHT OF ACCESS IN NAVIGABLE WATERS BY AN ACT OF THE SOVEREIGN,
Florida Univ., Gainesville. School of Law.
T. G. Morton, Jr.
Available from Eastern Water Law Center, 358 Holland Law Center, University of Florida, Gainesville, Florida 32611, for $1.55. May 1970, 21 p.

Descriptors: *Riparian rights, *Navigable waters, *Compensation, *Damages, Common law, River beds, River basins, River regulation, Rivers, Lake shores, Lake beds, Lake basins, Lakes, Land, Water resources, Water users, Access routes, Riparian waters, Riparian land, Navigation.

Riparian rights of access and navigation present distinct legal concepts. If the sovereign interferes with riparian access, the land owner should be compensated under the fifth amendment of the Constitution. However, if the interference does not affect access, but only impairs the riparian owner's opportunity to navigate in sovereign waters, compensation may not be required because there is no actual encroachment on the riparian owner's land. Courts today are tending to limit compensable rights strictly to cases involving an actual interference with riparian land resulting in a deprivation of access to the navigable water body. (Josepher-Florida)
W78-03374

LANGE V. TOWN OF NORWAY (MUNICIPAL LIABILITY FOR NEGLIGENT FLOODING).
253 N.W. 2d 240-45 (Wis. 1977).

Descriptors: *Wisconsin, *Dams, *Floods, *Negligence, Water control, Water injury, Water law, Water storage, Flood control, Flood damage, Water levels, Safety, Floodgates, Cities, Judicial decisions, Legal aspects, Crops, Dam construction, Cultivated lands, Runoff, Operation and maintenance, Structures.

Plaintiff landowner sought damages for crops ruined by flooding resulting from the negligent maintenance of a dam by a municipality. The municipality purchased the dam from a private owner. The state agency order granting transfer of ownership indicated that a long-term change in the runoff conditions of the area rendered the dam inadequate to control flood waters and mandated the construction of a new dam by September 1972. However, the new dam had not been constructed when the flood occurred in September 1972. The Wisconsin Supreme Court found the plaintiff's complaint to be insufficient since the basis for liability was unclear. The court held that the plaintiff could amend and replead his complaint since there was a possible cause of action in negligence. The court reviewed the circumstances under which a municipality could not claim sovereign immunity from civil suit. Wisconsin statutes allow suit against a municipality only where the municipality has negligently caused damage while performing its legislative function. The court indicated that if the municipality had implemented changes in the dam's physical condition or operation, it would be liable for any inadvertently ensuing damages. (Yawn-Florida).
W78-03375

MISSISSIPPI STATE HIGHWAY COMMISSION V. TYNER (OWNERS OF LAND BORDERING NATURAL WATERCOURSES MAY INCREASE AND ACCELERATE SURFACE WATER DRAINAGE WITHOUT LIABILITY).
345 So.2d 1050-51 (Miss. 1977).

Descriptors: *Mississippi, *Riparian land, *Surface drainage, *Culverts, Surface waters, Drainage water, Drainage, Highways, Legal aspects, Judicial decisions, Riparian rights, State governments, Surface runoff, Average runoff, Rain water, Drainage effects, Drainage practices, Ditches, Water conveyance,Damages.

Plaintiff landowner brought suit against the Mississippi State Highway Commission for damage to her property and for a mandatory injunction requiring the installation of culverts to carry water under her driveway. Highway construction had caused plaintiff's driveway to wash out due to increased volume and velocity of drainage water. The trial court granted plaintiff's request for the injunction only. The Supreme Court of Mississippi reversed and held that owners of land along the border of a natural watercourse may accumulate surface waters and cast them into the natural drainage or watercourse without liability to the lower riparian owner. The above principal holds true even though the flow of the water is accelerated and the volume increased. The Court said the responsibility to install a sufficient culvert lay with the plaintiff. (Moorhouse-Florida)
W78-03376

PORTER COUNTY CHAPTER OF IZAAK WALTON LEAGUE OF AMERICA, INCORPORATED V. TRAIN (PROCEDURAL RULES FOR INTERVENORS IN ENVIRONMENTAL PROTECTION AGENCY ADMINISTRATIVE HEARINGS).
548 F2d 1298-1302 (7th Cir. 1977).

Descriptors: *Indiana, *Lake Michigan, *Discharge(Water), *Permits, Legal review, Administrative agencies, Administration, Administrative decisions, Effluents, Water pollution, Waste water(Pollution), Water pollution sources, Regulation, Water quality, Legal aspects, Steel, Industries.

Petitioner environmental group concerned with the pollution of Lake Michigan by a steel company wished to intervene in a regulations adjudicatory hearing of the regional Environmental Protection Agency (EPA). Discharge permits for the polluting steel company were to be discussed at this hearing. The steel company had already been granted a permit to discharge effluents and the petitioner wished to challenge the permit issuance. EPA has explicit procedural rules governing adjudicatory hearings which the petitioner failed to follow. Consequently, the petitioner's motion to intervene was desmissed. Petitioner sought review of the dismissal. The Court of Appeals found no error in the dismissal and affirmed, concluding that the administrative law judge had reasonably complied with the EPA's procedural orders and had acted in good faith as evidenced by the numerous continuances he had granted the petitioner prior to dismissal for non-compliance. The merits of the petitioner's claim against the steel company were never dealt with because the petitioner failed to state its objections to the permit issuance as required by EPA rules. (Denker-Florida)
W78-03377

SAVE THE BAY, INCORPORATED V. MISSISSIPPI AIR AND WATER POLLUTION CONTROL COMMISSION (HEARING REQUIREMENTS FOR DISCHARGE PERMITS UNDER NPDES).
341 So.2d 98-100 (Miss. Sup. Ct. 1977).

Descriptors: *Mississippi, *Waste water disposal, *Discharge(Water), *Permits, Legal review, Chemical wastes, Administration, Administrative agencies, Administrative decisions, Effluents, Water pollution, Water pollution control, Water quality control, Bays, Waste water(Pollution), Water pollution sources, Water quality, Legal aspects, Titanium.

Mississippi law requires that any person or interested party aggrieved by any order of the pollution permit commission shall have a right to a hearing of the matter involved provided that no hearing on the same subject has already been held. DuPont Corporation had filed an application to discharge waste water into St. Louis Bay in accordance with the National Pollutant Discharge Elimination System (NPDES). After the DuPont application was filed, the pollution permit commission conducted an investigation which included an open public hearing. Later, appellant citizens' organization petitioned the commission for a new hearing on the question of the permit issuance based on concern over proposed discharges of titanium dioxide. Upon the failure of the commission to act on its request, the appellant sought relief in chancery court. The commission contended that appellant had already had an opportunity for a hearing as required by Mississippi law. The Mississippi Supreme Court held that appellant had been denied due process because the initial hearing was solely for the purpose of permitting interested parties to express their views and did not satisfy the hearing requirements contemplated by the statute. (Denker-Florida)
W78-03378

WATER SAVED OR WATER LOST: THE CONSEQUENCES OF INDIVIDUAL CONSERVATION MEASURES IN THE APPROPRIATION STATES,
For primary bibliographic entry see Field 3B.
W78-03379

APPALACHIAN POWER COMPANY V. TRAIN (REVIEW OF EPA REGULATIONS GOVERNING DISCHARGE OF HEAT).
545 F.2d 1351-81 (4th Cir. 1976).

Descriptors: *Electric powerplants, *Heated water, *Discharge(Water), *Thermal pollution, *Regulation, Fly ash, Cooling water, Runoff, Effluents, Thermal water, Heat, Heating, Heat flow, Costs, Cost-benefit analysis, Cost-benefit ratio, Cost-benefit theory, Legal aspects, Coolants, Cooling towers, Limiting factors, Federal government.

Petitioner power companies sought review of Environmental Protection Agency (EPA) regulations limiting heat discharges into navigable waters. The petitioners contended that heat should not be treated as other pollutants since thermal discharges may sometines be beneficial. The petitioners further contended that they were entitled to a variance and that, in considering their applicaton for a variance, economic impact should be taken into consideration, instead of only techni-

cal and engineering factors exclusive of cost. The court held that economic factors could be considered and therefore it was proper to examine the cost of technology necessary to achieve effluent reduction. The court also held that the EPA needed to review its regulatons concerning thermal backfit requirements, its prohibition on cooling lakes as an acceptable form of closed-cycle cooling, its regulations concerning runoff limitations from material storage and construction site runoff, and its regulations concerning a no-discharge limitation for fly ash transport water. The court directed the EPA to reassess and clarify its regulations. (Denker-Florida)
W78-03380

DUPONT DE NEMOURS COMPANY V. TRAIN (EFFLUENT LIMITATIONS BASED UPON INDUSTRY-WIDE REGULATIONS PERMISSIBLE UNDER SECTION 301).
97 S. Ct. 965-80 (1977).

Descriptors: *Effluents, Chemical industry, *Chemical wastes, *Inorganic compounds, Judicial decisions, Water pollution, Water pollution sources, Wastes, Discharge(Water), Industrial wastes, Liquid wastes, Waste water(Pollution), Waste water disposal, Legal aspects, Legal review, Water law, Administrative agencies, Pollutants, Pollution abatement.

Petitioners, companies engaged in the production of inorganic chemicals, challenged the Environmental Protection Agency's (EPA) authority under the Federal Water Pollution Control Act Amendments of 1972 to issue effluent limitations for existing point sources by regulation rather than on an individual basis. Petitioner's claim was based on an interpretation of Section 301 which views that section as a mere description of possible limitations and not an independent source of authority to issue effluent limitations by regulation. Under this view, Section 402 provides the only authority for the issuance of enforceable limitations. The United States Supreme Court disagreed and held the EPA has authority under Section 301 to limit discharges by existing plants through industry-wide regulations provided some allowance is made for variations in individual plants. The Supreme Court found that both the language of Section 301 and the legislative history supported this interpretation. The Court also determined that the courts of appeals had exclusive jurisdiction for review of EPA actions promulgating effluent limitations and that variances for individual plants unable to comply with the new source standards issued under Section 306 are not authorized. (Moorhouse-Florida)
W78-03381

CARLOTTO LIMITED V. COUNTY OF VENTURA (APPORTIONMENT OF FLOOD DAMAGE CAUSED BY NEGLIGENCE).
121 Cal. Rptr. 171-77 (Cal. App. 1975).

Descriptors: *Negligence, *Flood control, *California, *Dam failure, *Flood damage, Drainage systems, Judicial decisions, Legal aspects, Water law, Reservoir operation, Dams, Reservoirs, Runoff, Spillways, Diversion structures, Conveyance structures, Overflow, Administrative agencies, Silt, Damages.

Plaintiff property owner brought suit against the flood control district to recover damages incurred when the flood control system overflowed. The defendant government unit admitted negligence in maintenance of the flood control system, but contended there was no evidence that its negligence caused any part of the damage to plaintiff's property. The trial court found that defendants' negligence had been the cause of part of the damages to plaintiff's property, and apportioned the award on a formula based on the amount of debris the defendants had allowed to accumulate in the drainage system in proportion to the amount of silt which had been deposited over the plaintiff's factory. The plaintiff appealed, alleging the apportionment had not been pleaded by the defendants as an affirmative defense and should not have been injected by the trial judge. The California Second District Court of Appeal held that injection of apportionment was proper, but that the trial court had not used a rational basis to assess the defendants' contribution. The case was remanded with directions that the defendants must bear the burden of proof of the extent to which the damages should be apportioned. (Sloan-Florida)
W78-03382

LANE V. CITY OF REDONDO BEACH (MUNICIPALITY PROHIBITED FROM INTERFERING WITH PUBLIC ACCESS TO TIDELANDS OR NAVIGABLE WATERS).
122 Cal. Rptr. 189-94 (Cal. App. 1975).

Descriptors: *California, *Access routes, *Public access, *Beaches, *Navigable waters, Right-of-way, Local governments, State governments, Navigation, Fishing, Oceans, Structures, Buildings, Real property, Coasts, Water law, Legal aspects, Judicial decisions.

Plaintiff residents brought an action for declaratory judgement against defendant city alleging that the city had interfered with their right of free access to tidelands and navigable waters thus violating their constitutional and statutory rights. The defendant city, situated on the Pacific Coast, had been granted all tidelands adjacent to its coastline by the state which holds tidelands in trust for the public for navigation, fishery, and commerce. The city adopted a redevelopment plan which provided for the acquisition of all land, the demolition of all buildings, and the vacation of all streets in a prescribed area. The defendant then constructed buildings on the acquired land over former right-of-ways cutting off easy access to the ocean. The trial court dismissed the complaint. The Second District Court of Appeal reversed finding that there was a strong public policy favoring public access to the coast. The basic purpose of entrusting the tidelands to municipalities was to insure such access. To allow a municipality to deprive the public of its right of access to tidelands or navigable waters by the exercise of its admitted municipal power to vacate streets would destroy the trust. (Petruff-Florida)
W78-03383

REA ENTERPRISES V. CALIFORNIA COASTAL ZONE COMMISSION (CALIFORNIA COASTAL ZONE COMMISSION REVIEW OF REGIONAL PERMITS).
125 Cal. Rptr. 201-20 (Cal. App. 1975).

Descriptors: *California, *State governments, *Coasts, *Land development, *Permits, State jurisdiction, Regulation, Zoning, Legal review, Legislation, Land use, Ecosystems, Administration, Regions, Legal aspects, Administrative decisions, Judicial decisions.

Under the California Coastal Zone Conservation Act, developers who want to build in coastal zones must obtain permits from a regional coastal zone commission. Regional permit decisions are appealable to the state coastal zone commission. Respondent developer was granted a permit to construct condominiums in a coastal zone in Southern California and an appeal was taken. The state commission refused to approve the issuance of the permit after a tie vote by its members and the respondent sought a writ of mandamus to secure the permit. The respondent argued that a tie vote constituted an affirmation of the regional commission's decision because the state commission was unable to obtain a majority against the permit. The California Second District Court of Appeal upheld the denial saying legislative intent was to create a state commission with enlarged appellate powers including the power to conduct a de novo hearing in which the commission could exercise its independent judgement on the record and reviewing evidence unavailable at the regional hearing. Therefore, the state commission has the ultimate power over permits, making a tie vote sufficient to deny the permit. (Denker-Florida)
W78-03384

NO OIL, INCORPORATED V. OCCIDENTAL PETROLEUM CORPORATION (EXEMPTIONS FROM PERMIT REQUIREMENTS UNDER THE CALIFORNIA COASTAL ZONE CONSERVATION ACT).
123 Cal. Rptr. 589-605 (Cal. App. 1975).

Descriptors: *California, *Drilling, *Permits, *Oil industry, Legal aspects, State governments, Regional development, Coasts, Drill holes, Application methods, Environment, Environmental effects, Oil, Exploration, Oil wells, Legal review, Water law, Oil fields.

Plaintiff conservation group brought an action against defendant oil company to enjoin the defendant from exploratory drilling in a Southern California coastal zone without a permit from the coastal zone commission. The defendant claimed that its drilling operation was exempt from the permit requirement because it had begun its drilling prior to the enactment of the Coastal Zone Conservation Act requiring such permits and it had acted in good faith in commencing its activities. The plaintiff sought a declaratory judgment on the issue of whether defendant's drilling operation was exempt from the act's permit requirement. The trial court found for defendant oil company but the Second District Court of Appeal reversed. The court held that the defendant could not conduct exploratory drilling without obtaining a permit because both good faith and lawfulness were prerequisites to exemption. The court found that the lawfulness requirement was not met because the drilling district ordinances on which defendant based its actions had been found void by the California Supreme Court in other litigation. (Denker-Florida)
W78-03385

BUCHANAN V. CITY OF NEWPORT BEACH (MUNICIPAL RESPONSIBILITY FOR SURFING INJURIES INDIRECTLY RELATED TO CONSTRUCTION OF JETTY).
123 Cal. Rptr. 338-42 (Cal. App. 1975).

Descriptors: *California, *Jetties, *Wave action, *Surf-boarding, *Hazards, Water sports, Sands, Dredging, Beaches, Public lands, Flow, Oceans, Ocean waves, Shores, Waves(Water), Surf, Slopes, Construction, Accidents, Harbors, Sand spits, Safety, Cities.

Plaintiff surfer brought suit against defendant city for injuries sustained as a result of wave action caused by the construction of a jetty and the dredging and deposit of sand at a beach. The complaint alleged that the injury resulted from the defendant's failure to give warning of a dangerous condition. The beach in question was created through the construction of a jetty when sand dredged from the channel of the harbor entrance adjacent to the jetty was deposited on submerged sand spits. This raised the beach level twenty-seven feet causing a steep slope from the shoreline into the water. This condition when added to the action of the ocean swells against the jetty produced a dangerous surfing condition. The trial court granted a nonsuit finding that the plaintiff's injury was caused by a natural condition of unimproved public property with no liability on the part of the defendant. The California Fourth District Court of Appeal reversed holding that there was sufficient evidence to demonstrate both that the defendant exercised control over the beach which was an exceedingly dangerous surfing area and that the improvements were the cause of the injury. (Petruff-Florida)
W78-03386

GLEGHORN V. CITY OF WICHITA FALLS (IMPROPER JURY INSTRUCTIONS IN CONDEMNATION SUIT).
545 S.W.2d 446-48 (Tex. Sup. Ct. 1976).

Descriptors: *Texas, *Damages, *Condemnation, *Condemnation value, Judicial decisions, Legal aspects, Easements, Compensation, Value, Water districts, Flood discharge, Flow, Flooding, Submergence, Discharge(Water), Backwater, Surges, Water control.

In a condemnation suit, plaintiff water improvement district sought to enlarge an existing flowage easement over the defendant's land. The defendant was awarded substantial damages and the plaintiff appealed. At issue were the contents of the jury instructions. The appellate court reversed and remanded finding a portion of the jury instructions objectionable. The Texas Supreme Court affirmed the holding of the appellate court but disagreed with its reasoning. The appellate court found that an impermissible comment was made on the weight of the evidence when the jury was told that plaintiff 'can' exercise the rights acquired to the fullest extent. The state supreme court disagreed, stating that use of the word 'can' did not imply the property would be put to its most damaging use. The supreme court, however, objected to the statements which advised the jury that the easement being taken was to be used for the purpose of submerging the land. The court found that the plaintiff sought only an additional flowage easement not the right to totally submerge the property as stated in the jury instruction. A new trial was granted with orders to correct the jury instructions. (Petruff-Florida)
W78-03387

SMITH-SOUTHWEST INDUSTRIES V. FRIENDSWOOD DEVELOPMENT COMPANY (LIABILITY OF PERCOLATING WATER USER FOR SUBSIDENCE OF LAND).
546 SW2d 890-99 (Tex. Civ. App. 1977).

Descriptors: *Water rights, *Texas, *Land subsidence, *Percolating water, Wells, Legal aspects, Judicial decisions, Subsidence, Negligence, Groundwater, Pumps, Water law, Relative rights, Subsurface water, Percolation, Well regulations, Water resources, Damages, Water table, Reasonable use, Withdrawal.

Plaintiff landowners brought a class action suit against defendant landowners seeking recovery of subsidence of land allegedly caused by the defendant's withdrawal of percolating underground water. The plaintiffs based their action on four theories: nuisance, negligence, intentional interference with their property, and wrongful taking and conversion of their property. The defendants contended that Texas law allows no right to recover for damages resulting from withdrawal of underground water regardless of damage sustained by neighboring lands. The trial court granted summary judgment against the plaintiffs. The Texas Court of Civil Appeals reversed holding that the plaintiffs could base their cause of action on theories of negligence and nuisance in fact. The court stated that, with respect to a landowners' right to use percolating water beneath his land, Texas adheres to the English rule of absolute ownership rather than the American rule of reasonable use. In Texas, however, the English rule is modified by the requirement that a person must use his property so as to avoid harm to others. The court also found that the defendant's third-party action against other groundwater users for indemnity and contribution was proper. (Capehart-Florida)
W78-03388

PLEASANT VIEW UTILITY DISTRICT V. VRADENBURG (RECOVERY FOR TAKING OF FLOWAGE EASEMENT BARRED BY STATUTE OF LIMITATIONS).
545 S.W.2d 733-36 (Tenn. Sup. Ct. 1977).

Descriptors: *Tennessee, *Discharge(Water), *Drainage water, *Easements, *Public utility districts, Waste water treatment, Eminent domain, Water treatment, Flow, Dispersion, Legal aspects, Water purification, Water storage, Chlorination, Treatment, Filters, Waste water disposal, Drainage effects, Utilities.

Respondend landowners, having purchased property in 1974, sought to enjoin petitioner utility district from discharging waste water onto that land. The respondents charged that since 1964 the petitioner under its power of eminent domain had intentionally, regularly, and necessarily discharged a large volume of water from a water treatment facility onto their land. The respondents alleged that this action by the petitioner constituted a flowage easement. The petitioner moved to dismiss the action claiming that the action was barred by the statute of limitations. The Tennessee Supreme Court found that in 1964 petitioner constructed a water purification and chlorination facility and a water storage tank on land adjoining the respondents' property. The operation of the facility required that the petitioner flush the filtration system at least once every three days. From the outset, the flushing water was discharged across respondents' land. Although there was no question that petitioner took a flowage easement, the inverse condemnation statute required that the action be filed in circuit court within twelve months of the taking. The Supreme Court affirmed the lower court's dismissal of the action. (Petruff-Florida)
W78-03389

FLORIDA SAFE DRINKING WATER ACT (PROPOSED LEGISLATION).
Florida House Bill 1262 (1977).

Descriptors: *Water quality, *Water quality standards, *Potable water, *Regulation, *Florida, Water purification, Water quality control, Administrative agencies, Inspection, Public health, Legal aspects, Water treatment, Water supply, Water utilization, Standards, Domestic water, Water analysis, Facilities, Pre-treatment(Water), Public utilities, Sampling, Legislation.

The Florida House of Representatives is considering a bill relating to safe drinking water. The bill would require the Department of Environmental Regulation to adopt primary and secondary drinking water regulations. It would also require the department to adopt a plan for emergency provision of drinking water as well as granting the discretionary power to deal with other imminent hazards. The department would have the responsibility for inspecting public water systems and the power to impose penalties for noncompliance with its regulations. With the passage of the bill, a state public water supply laboratory certification program would go into effect, as well as a public water supply accounting program. The bill would amend current Florida law by providing for the regulation of operators of water purification and waste-water treatment plants. The bill provides the Department of Health and Rehabilitative Services with supervisory duties and enforcement powers over water systems not covered by this bill. The powers and duties of the Division of Health are deleted as they relate to water supply systems, methods of water purification, and drainage disposal. (Denker-Florida)
W78-03390

BUCHANAN V. LOS ANGELES COUNTY FLOOD CONTROL DISTRICT (RESPONSIBILITY OF FLOOD DISTRICT FOR CONTROLLING WATER FLOW).
128 Cal. Rptr. 770-73 (Cal. App. 1976).

Descriptors: *Dams, *Drainage systems, *Discharge(Water), *California, Negligence, Diversion dams, Diversion, Flow, Floods, Flood damages, Erosion, Reservoirs, Flood control, Flow control, Water control, Ditches, Water spreading, Water levels, Riparian rights, Safety, Hazards.

Plaintiff landowner brought an action for wrongful death against defendant flood control district. The plaintiff alleged that the defendant's negligence in the operation and maintenance of the flood control system resulted in the drowning death of his son. The jury found for the defendant and the plaintiff appealed. The flood control system consisted of four dams which were controlled manually. Water was regularly diverted from these dams into several washes. Plaintiff owned property which abutted one of these washes. Prior to January, 1969, the custom of the defendant had been to warn residents when the rate of discharge equaled 300 cfs. In January 1969, heavy rains necessitated a diversion of water from one watershed to another. Without warning, the defendant began releasing water into the wash at a rate exceeding 900 cfs. The release of this large quantity of water eroded a hole below the fence revertment along plaintiff's property. The plaintiff's son fell through this hole and drowned in the deep water of the wash. The appellate court in reversing the jury verdict found that certain jury instructions were prejudicial to the plaintiff's theories of recovery. (Petruff-Florida)
W78-03391

SWANSON V. MARIN MUNICIPAL WATER DISTRICT (WATER DISTRICTS EMPOWERED TO REGULATE WATER USE IN EMERGENCIES).
128 Cal. Rptr. 485-93 (Cal. App. 1976).

Descriptors: *California, *Water districts, *Water shortage, *Water consumption, Water yield, Pipelines, Water users, Legal aspects, Water supply, Water distribution(Applied), Regulation, Administrative agencies, Water demand, Water policy, Water allocation(Policy), Safe yield, Water utilization.

Plaintiff landowner sought and obtained a peremptory writ of mandate compelling defendant water district to grant plaintiff a pipeline extension and to provide water service to the plaintiff's real property. The defendant had rejected the plaintiff's initial petition pursuant to its finding that the estimated water consumption in the district would exceed the expected water yield. Since the ordinary demands of consumers could not be met without depleting the water supply to the district to the extent that there would be insufficient water for human consumption, sanitation, and fire protection, the defendant concluded that a water shortage emergency condition prevailed in the area. The defendant then imposed a moratorium on the granting of new water services. The First District Court of Appeal reversed the lower court order finding that the defendant was empowered to anticipate a future water shortage and to impose appropriate regulations and restrictions to control its water supply. The court held that the moratorium on new service was neither unreasonable nor an invasion of the plaintiff's constitutional rights when actual water consumption was already in excess of the net safe water yield. (Petruff-Florida)
W78-03392

CARMEL VALLEY VIEW, LIMITED V. BOARD OF SUPERVISORS, IN AND FOR COUNTY OF MONTEREY (DENIAL OF USE OF SEPTIC TANKS IN PROPOSED SUBDIVISION).
130 Cal. Rptr. 249-53 (Cal. App. 1976).

Descriptors: *California, *Waste disposal, *Septic tanks, *Seepage, *Land development, Regulation, Standards, Mapping, Legal aspects, Sewage, Effluents, Maps, Sewage disposal, Sewage effluents, Water pollution control, Wastes, Water pollution, Pollutants, Environmental effects.

Plaintiff developer brought suit to require the planning commission and board of supervisors of Monterey County to approve a tentative subdivision map. The planning commission had denied approval after a finding that the development site was not physically suitable for the type of sewage disposal system planned by the plaintiff. The plaintiff claimed that the planned septic tanks were a safe means of disposal and that the commission's denial did not rest on the evidence. The California First District Court of Appeal reversed the lower court's decision in favor of the plaintiff. The court held that the environmental impact report on which the county had based its denial was sufficient to sustain that denial. The report indicated that seepage of waste effluent from the proposed septic tanks might eventually reach a nearby river because the property was on a steep slope and the thin topsoil and limited permeability of the underlying shale might allow direct infiltration of underground water by untreated effluents. (Denker-Florida)
W78-03393

ELLISON V CITY OF SAN BUENAVENTURA (NO CAUSE OF ACTION FOR LOWER RIPARIAN OWNER UNDER REASONABLE USE DOCTRINE).
131 Cal. Rptr. 433-38 (Cal. App. 1976).

Descriptors: *California, *Settling basins, *Sediment transport, *Riparian rights, *Dredging, *Natural flow doctrine, *Reasonable use, Easements, Silts, Legal aspects, Water rights, Canal construction, Canals, Drainage systems, Drainage, Riparian land, Natural flow, Natural use, Local governments, Surface waters.

Plaintiff landowner sued the city and county for injunctive relief and damages in class action suit on behalf of other property owners, boat owners and taxpayers within the county port district. The plaintiff's land abutted a barranca, a natural drainageway to the ocean. Formerly the water drained directly into the ocean but city and county dredging operations created a series of canals that rerouted the waterflow, resulting in the creation of a settling basin for particulate matter on its way to the ocean. Silt and debris once carried to the ocean settled in the barranca. The plaintiff claimed damages because his taxes had increased due to higher costs for dredging and maintenance of the waterways. He also claimed that the defendant had taken his easement rights and reduced his property values. The Second District Court of Appeal affirmed the lower court's dismissal holding that, under the natural water-course rule, an improvement such as drainage does not give a lower riparian owner a cause of action due to increased flow and its incidents. The court further found no cause of action using the higher standard of reasonable use because defendant's actions were reasonable. (Denker-Florida)
W78-03394

TRI-CHEM, INCORPORATED V LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, COUNTY OF LOS ANGELES (DUTIES OF MUNICIPALITIES TO PROVIDE WATER RUNOFF PROTECTION FOR PRIVATE LANDOWNERS).
132 Cal. Rptr. 142-48 (Cal. App. 1976).

Descriptors: *California, *Flood damage, *Drainage water, *Negligence, *Ditches, Flood flow, Rainfall, Natural flow, Legal aspects, Runoff, Drainage systems, Water levels, Water level fluctuations, Floods, Flood discharge, Damages, Rainfall-runoff relationships.

Plaintiff landowners property that formed a natural sump. During an unusually heavy rainfall, flood overflow damaged the plaintiffs' property. Suing on theories of negligence and inverse condemnation, the plaintiffs contended that defendant county and city were negligent because the flood control facilities provided by them were inadequate to deal with water runoff. The plaintiffs further contended that the defendants had a duty to maintain drainage ditches capable of handling the increased waterflow. The defendants argued that the proximate cause of the plaintiffs' damages was not due to any negligence in maintaining the ditch or drain and that the flood control project had reduced the natural flooding of the plaintiffs' property. The California Second District Court of Appeal held that without the defendants' flood control project, the plaintiffs' damages would have been worse. The court said the defendants were under no duty to provide flood control services to meet all climatic contingencies. The plaintiffs' recovery would require proof that the defendants' actions had resulted in increased waterflow on their land. (Denker-Florida)
W78-03395

CITY OF GRAND JUNCTION V. KANNAH CREEK ASSOCIATION (RIGHT TO CHANGE BENEFICIAL USE OF APPROPRIATED WATERS).
557 P.2d 1169-72 (Colo. 1976).

Descriptors: *Colorado, *Water distribution(Applied), *Water storage, *Prior appropriation, Irrigation water, Local governments, Rivers, Diversion, Municipal water, Flow, Appropriation, Conjunctive use, Streams, Regulation, River flow, Cities, Return flow, Beneficial use, Consumptive use, Preferences(Water rights).

Defendant city purchased direct flow rights to a river. It later petitioned the District Court for a change in the point of diversion, and a change to municipal use in addition to the previously designated irrigation use. Plaintiff water user's association protested this action on the ground that the municipal use precluded return flow to others. The city was also appealing an order enjoining it from storing water not immediately required for municipal purposes. The Supreme Court of Colorado held that purchase of water rights includes the right to change the appropriation to another beneficial use; however, the right to change the use to one involving storage is conditional. All appropriators, including those whose rights are junior, have a right to the continuance of the conditions existing on the stream at, and subsequent to, the time they made their appropriations, unless a change can be made without injury to those rights. Since the issue of rights of junior appropriators and the necessity of imposing conditions to protect the objectors had not been tried, the case was remanded to determine these issues. (Rieck-Florida)
W78-03396

CITY OF GRAND JUNCTION V. KANNAH CREEK ASSOCIATION (THE SCOPE OF PERMISSIBLE WATER USE ACQUIRED BY A CONDEMNATION JUDGMENT).
557 P2d 1173-80 (Colo. 1976).

Descriptors: *Colorado, *Appropriation, *Water storage, *Condemnation, Cities, Eminent domain, Legal aspects, Relative rights, Water supply, Beneficial use, Water law, Competing uses, Municipal water, Water rights, Compensation, Prior appropriation, Water distribution(Applied), Judicial decisions, Water works, Storage, Reservoirs.

Plaintiff city sought a determination that its water rights acquired in a 1911 eminent domain proceeding would allow it to change the use of such water to include storage thereof. The water referee ruled that the condemnation judgment impliedly gave the city a right to store water as an integral part of its authority to construct water works and distribute water to its inhabitants. The judge rejected the referee's ruling, but the Colorado Supreme Court reversed and adopted the ruling permitting the storage of water. The decision rests on the distinction between condemnation judgments and appropriation decrees. Plaintiff city had obtained a condemnation judgment which concurrently required it to compensate all prior appropriators for damages caused by such condemnation. The judgment vested in the city a paramount right to the water so condemned and allowed the city to use the water in any way reasonably necessary to promote the public welfare of its inhabitants. The dissent contends that storage rights and direct flow rights are significantly different with only the latter acquired by and compensated for in the condemnation action. (Moorhouse-Florida)
W78-03397

CITY OF BOULDER V. BOULDER AND LEFT HAND DITCH COMPANY (RIGHTS OF JUNIOR APPROPRIATORS TO RETURN FLOW).
557 P.2d 1182-86 (Colo. 1976).

Descriptors: *Irrigation water, *Colorado, *Prior appropriation, *Return flow, *Diversion, Judicial decisions, Relative rights, Legal aspects, Water law, Water rights, Appropriation, Priorities, Preferences(Water rights), Diversion loss, Returns, Water reuse, Seepage, Alteration of flow, Cities.

Plaintiff city, a junior appropriator, sought an injunction to prevent defendant ditch companies, senior appropriators, from transporting water for use in another watershed. For nearly one hundred years one defendant's irrigation appropriation had been used on land the return flow of which entered Boulder Creek. In contrast, the other defendant's appropriation was used to irrigate land the return flow of which entered other streams. The second defendant was diverting and transporting some of the water decreed to the first defendant thereby forcing the city to reduce its appropriation from Boulder Creek in order to compensate for the loss of return flow. The water judge dismissed the complaint but the Colorado Supreme Court reversed. The court first noted that the law makes no distinction between change of point of diversion and change of place of use so far as rights of junior appropriators are concerned. It then distinguished the rights of a junior appropriator to return flow from his rights to waste water. As to the latter no permanent right to the discharge can be acquired. But as to the former, junior appropriators have rights to the extent that they may not be injured by a change in the place of use of irrigation water which provided that return flow. (Moorhouse-Florida)
W78-03398

STATE EX REL. BROWN V. BROOKSIDE RECLAMATION, INCORPORATED (EXHAUSTION OF ADMINISTRATIVE REMEDIES REQUIRED BEFORE INSTITUTION OF NUISANCE ACTION).
356 N.E.2d 733-47 (Ohio Ct. App. 1975).

Descriptors: *Ohio, *Water pollution, *Landfills, *Waste disposal, Water law, Abatement, Air pollution, Legal review, Permits, Water pollution control, Legislation, Jurisdiction, Sewage disposal, Solid wastes, Water pollution sources, Judicial decisions, Legal aspects, Waste treatment.

Plaintiff Ohio Attorney General sought to enjoin the operation of a sanitary landfill. The plaintiff alleged that the defendant, a licensed solid waste disposal operator, had diverted underground watercourses depleting local wells, polluted local streams, produced noxious odors, and otherwise maintained a public nuisance. The defendant maintained that the trial court did not have jurisdiction because administrative remedies had not been exhausted. The trial court denied the relief sought and the court of appeals affirmed holding that the prescribed administrative procedures for investigation and enforcement of environmental violations are exclusive. The procedures established to regulate facilities within the scope

of the Ohio Environmental Protection Agency are designed to resolve technical environmental disputes before they reach the courts. The court further held that licensing did not exempt the defendant from prohibitions against water pollution, nor did water and drainage from the site run into a sewerage system when it flowed into the open sewers and ditches of a nearby town. Rather, a sewerage system contemplates the collection of wastes for treatment and not merely the conducting of wastes into lakes and rivers. (Moorhouse-Florida)
W78-03399

BOURGEOIS V. UNITED STATES (TITLE TO ISLANDS IN NON-NAVIGABLE BODIES OF WATER).
545 F2d 727-35 (Ct. Cl. 1976).

Descriptors: *Eminent domain, *Non-navigable waters, *Ownership of beds, *Boundaries(Property), *Islands, Legal aspects, Bodies of water, Beds, Riparian rights, Federal jurisdiction, Water law, Lake beds, Real property, Lake shores, Land tenure, Boundary disputes, Adjacent landowners, Michigan, Judicial decisions, Navigable waters.

Plaintiff landowner sought recover for the value of an island in a non-navigable lake allegedly appropriated by the United States. The original 1846 survey and plat had omitted the island. After the island first appeared on an official plat in 1959, the government posted the island as federal land. The plaintiff, who owned lakeshore lots, claimed nineteenth century patents had transferred the island from the government to private landowners. The defendant asserted no intent to transfer the island could be shown. The United States Court of Claims held that under federal commonlaw, if the intent was ambiguous and the government had granted shoreland along non-navigable waters, it had also passed title to islands according to the state law where the property was located. Since the government had failed to reserve the island, it impliedly patented it. Michigan law gives title to non-navigable water beds to shoreland owners in pie-shaped fashion to the center of the body of water. Applying non-navigable water bed law to the island, the court said if the plaintiff could show her succession to the patentee's ownership interests, she could recover for the government's taking. (Cotcheu-Florida)
W78-03400

TWIN LAKE RESERVOIR AND CANAL COMPANY V. CITY OF ASPEN (INTENT AND PHYSICAL ACT REQUIRED FOR APPROPRIATION).
557 P.2d 825-31 (Colo. 1976).

Descriptors: *Colorado, *Permits, *Water allocation(Policy), *Appropriation, Prior appropriation, Adjudication procedure, Diversion, Water distribution(Applied), Judicial decision, Legal aspects, Administrative, Water policy, Water requirements, Water rights, Water supply, Water law, Canals, Water conveyance, Water control.

Plaintiff, operator of a water diversion system, sought a conditional decree to an additional one hundred cubic feet of water per second from water proceeding from a collection to a reservoir. Colorado law mandates that in order to initiate an appropriation of water there must be a 'first step' consisting of (1) an intent to appropriate and (2) an open physical demonstration indicating that intent. The Supreme Court of Colorado held that the filing of an application for adjudication of a water right was sufficient evidence of the intent requirement. In regard to the necessity of a physical demonstration, the court held that the fact that the plaintiff-operator's physical act of building a canal with sufficient carrying capacity had occurred prior to the formation of his intent to appropriate the additional water should not preclude him from obtaining the conditional decree. The dissenting opinion argued that the purpose of the physical act requirement was to serve notice of the intent to appropriate. The dissenters felt the majority opinion would lead to abuse of the doctrine of conditional water rights. (Rieck-Florida)
W78-03401

SABINE RIVER COMPACT.
Tex. Water Code Ann. 44.001 through .010 (1972).

Descriptors: *Texas, *Interstate compacts, *Project planning, *Interstate rivers, Water law, Legal aspects, Regulation, Administrative agencies, Interstate commissions, Construction, Louisiana, Reservoir storage, Water management(Applied), Water supply, State governments, Beneficial use, Planning, Water policy, Cost sharing, Appropriation, Water rights.

The state of Texas has ratified the Sabine River Compact entered into with Louisiana for the purpose of establishing cooperative planning for the construction, operation and maintenance of projects for water conservation and utilization purposes on parts of the river touching both states. The pact does not deal with pollution abatement or salt water intrusion problems. All free water in the stateline reach shall be divided equally between the states. Since a minimum flow is necessary for the benefit of water users below the stateline in both states, restrictions are agreed on to insure maintenance of a minimum flow. Each state may construct impoundment reservoirs or other improvements on the portion of the river located wholly within its boundaries. Except for jointly stored water, each state must use its apportioned share of the natural stream flows as they occur with no accumulation of credits or debits. All waters used for domestic and stock water uses are excluded from apportionment. Each state may use its share of water in any manner that it deems beneficial. An interstate administrative agency is created to administer the terms of the compact. (Rieck-Florida)
W78-03402

MARL, SAND, GRAVEL, SHELL AND MUDSHELL.
Tex. Parks and Wildlife Code Ann. Sec 86.001 thru .019 (1976).

Descriptors: *Texas, *Sediments, *Commercial shellfish, *Navigable waters, *Dredging, Marl, Soil types, Sands, Gravels, Management, Administrative agencies, Oysters, Aquatic life, Navigation, Local governments, Federal government, Permits, Bodies of water, Financing, Fish hatcheries, Seawalls, Economic impact, Freshwater.

No person may disturb or take marl, sand, gravel, shell or mudshell which is under the management of the state or operate in or disturb any oyster bed or fishing water for any purpose other than that necessary or incidental to navigation or dredging under state or federal authority unless a permit authorizing the activity is acquired first. If no damage will result to oyster beds, bodies of water, or any fish, and if no current affecting navigation will be altered, a permit may be issued. Economic considerations will be weighed in relation to the injurious effect on the beds and fish. The permits are not assignable. No special privileges or exclusive rights will be granted to take sand or shell. Any county, city or town with a permit is not required to purchase the material taken and used for roads and streets or seawalls. Sands and other deposits with no commercial value may be taken from designated locations. Three-fourths of the proceeds from the sale of the materials shall be used for the construction and maintenance of fish hatcheries. Violators of these sections shall be guilty of a misdemeanor. (Rieck-Florida)
W78-03403

KANSAS GROUNDWATER EXPLORATION AND PROTECTION ACT.
Kan. Stat. Ann. secs 82a - 1201 thru -1215 (Supp. 1975).

Descriptors: *Kansas, *Well permits, *Groundwater resources, *Water wells, Groundwater, Groundwater availability, Underground structures, Underground, Geology, Geologic investigations, Water quality control, Water control, Water law, Water supply, Water permits, Well regulations, Wells, Construction, Water quality, Water contracts.

Kansas has enacted legislation providing for the exploration and protection of the state's groundwater. This act requires licensing of water well contractors. The contractors must keep logs containing data reflective of water quality. Well construction standards may be set by the state. Procedures for obtaining well construction licenses are specified. Applicants may be examined as to their familiarity with the state's groundwater laws and their knowledge of well construction and underground geology. Applicants must post surety bonds and meet financial requirements before licenses are issued. Licenses are valid for one year, subject to suspension and revocation. Violations of the act, negligence, incompetence, and fraud in obtaining a license constitute grounds for suspension and revocation of the license. Hearings regarding revocations are held before a state administrative officer and may be appealed to the district court. Willful violation of the act is made a misdemeanor. (Josepher-Florida)
W78-03404

STATE WATER PLAN STORAGE ACT (KANSAS).
Kan. Stat. Ann. secs 82a-1301 thru -1320 (Supp. 1975).

Descriptors: *Kansas, *Conservation, *Water contracts, *Water storage, *Reservoir storage, Hydrologic aspects, Legislation, Storage, Reservoirs, Droughts, Drought tolerance, Drought resistance, Beneficial use, Water control, Water costs, Water demand, Hydrology, Water permits, Water management(Applied), Water rates, Water supply, Water users.

Kansas has enacted a water plan storage act making all waters contained in conservation storage water reservoirs named in the plan the property of the state. The state is authorized to divert and store the waters of all streams flowing into such reservoirs to insure an adequate yield of water for beneficial use through specified drought conditions. The state water resources board shall acquire water reservation rights by filing a notice with the chief engineer. State contracts for withdrawals and use of waters from conservation water supplies must comply with the provisions of this act. Filing procedures, rate of charges, and length of terms of water contracts allowable under the act are specified. In addition, the water resources board is empowered to enforce claims or rights arising out of water contracts. (Josepher-Florida)
W78-03405

REPUBLICAN RIVER COMPACT.
Kan. Stat. Ann. secs 82a-518 (1969).

Descriptors: *Legislation, *Interstate compacts, *River basin development, *Kansas, Nebraska, Colorado, Water contracts, Water policy, Reservoirs, Reservoir construction, Reservoir operation, Water supply development, Water resources, Water management(Applied), River systems, River regulation, Rivers, Federal government, Flood control, Interstate, Interstate rivers, River basin commissions, River basins.

The state of Kansas has ratified the Republican River Compact signed by Colorado, Kansas and

Nebraska in 1942. The compact has for its purposes the promotion of efficient and equitable use of the waters of the Republican River Basin, the achievement of interstate comity, and the encouragement of flood control measures. Beneficial consumptive use is recognized as the most efficient utilization of the waters in the basin. The basin area includes all of that portion within the three states which is naturally drained by the Republican River and its tributaries up to the river's junction with the Smoky Hill River in Kansas. Specific water allocations are computed from the average water supply within the basin. Lower states may participate in the construction and future use of reservoirs in upper states, subject to laws of the upper state. Officials of the three states collaborate with United States officials in the administration of the compact. A map of the Republican River basin is included with the act. (Josepher-Florida)
W78-03406

ARKANSAS RIVER COMPACT.
Kan. Stat. Ann. sec 82a-520 (1969).

Descriptors: *Interstate Compacts, *Colorado, *Kansas, *River regulation, *Interstate rivers, Water contracts, Water policy, Reservoirs, Reservoir construction, Reservoir operation, Water supply development, Water resources, Water management(Applied), River systems, Rivers, Federal government, Interstate, Irrigation programs, Administration, State jurisdiction, State governments.

The legislature of Kansas has ratified the Arkansas river compact formed by the states of Kansas and Colorado. The Compact was established to eliminate controversies between the two states concerning the control, conservation and utilization of the Arkansas river for irrigation purposes. A second major purpose of the Compact was to allow equitable apportionment of the benefits arising from the John Martin Reservoir Project. The quantity of water available for release from the John Martin Reservoir, and procedures for obtaining such release are detailed, together with the limits of jurisdiction of Kansas and Colorado over waters which originate or flow through the respective states Also described is the interstate agency known as the Arkansas River Compact Administration which was created to administer the Compact. (Josepher-Florida)
W78-03407

ARKANSAS RIVER BASIN COMPACT, KANSAS-OKLAHOMA.
Kan. Stat. Ann. sec 82a-528 (1969).

Descriptors: *Interstate compacts, *River basin development, *Oklahoma, *Kansas, *River basin commissions, Water policy, Water contracts, Water supply development, Water resources, Water management, River systems, River regulation, Rivers, Interstate, Interstate rivers, River basins, Water importing, Topographic mapping, Pollution abatement, Administration, State jurisdiction, State governments.

The state of Kansas has ratified the Arkansas river basin compact between Kansas and Oklahoma. The major purposes of the compact are: apportion equitably the waters of the Arkansas river basin between the two states and promote their development; promote interstate comity; administer the water apportionment provisions of the compact through the Kansas-Oklahoma Arkansas river commission; encourage the maintenance of active pollution abatement programs in the two states. For apportionment purposes, the Arkansas river basin is divided into five major topographic subdivisions. Subject to certain exceptions, both states shall have free and unrestricted use of the waters of the river basin which are within the respective states. The compact includes provisions for the construction and operation of new conservation storage capacity. The compact also details the rights of the states to import and export water to or from major subbasins within the same state. The compact is to be reviewed for purposes of amendment and supplementation twenty-five years after its effective date. (Josepher-Florida)
W78-03408

BIG BLUE RIVER COMPACT, KANSAS-NEBRASKA.
Kan. Stat. Ann. sec 82a-529 (Supp 1975).

Descriptors: *Interstate compacts, *Kansas, *Nebraska, *River basin development, Low-flow, Low-flow augmentation, Water contracts, Water policy, Reservoirs, Construction, Reservoir operation, Water supply development, Water resources, Water management, River systems, River regulation, Interstate, Interstate rivers, River basin commissions, River basins, Water quality control.

The Kansas-Nebraska Big Blue River Compact was ratified by the state of Kansas. The purposes of the compact are to promote interstate comity, to achieve an equitable apportionment of the waters of the Big Blue river basin, to encourage orderly development of the basin, and to establish an active pollution abatement program in both states. An interstate agency is created to administer the act. The compacting states subscribe to the principle of including storage capacity for low-flow regulation in reservoirs constructed by the federal government. Water released from these reservoirs is to remain available in the stream. Nebraska's use of water from river basins within the state is subject to detailed provisions which seek to maintain minimum mean daily flows. Kansas has unrestricted use of all waters of the basin which flow into the state. Neither state may export water from the basin without approval of the administration. Both states agree to cooperate in maintaining the basin's water quality. Subject to Nebraska law, Kansas has the right to construct or participate in future construction and use of storage reservoirs in the Big Blue and Little Blue basins in Nebraska. (Josepher-Florida)
W78-03409

APPROPRIATION OF WATER FOR BENEFICIAL USE.
Kan. Stat. Ann. secs 82a - 701 thru -725 (1969).

Descriptors: *Water management(Applied), *Kansas, *Prior appropriation, *Beneficial use, *Water permits, Allotments, Preferences(Water rights), Legislation, Adjudication procedure, State governments, State jurisdiction, Water policy, Water rights, Water supply, Water users, Administration, Appropriation, Water control.

Kansas has enacted legislation providing that water within the state is dedicated to the use of the people of the state. Subject to existing vested interests, all waters within the state may be appropriated for beneficial use; however, the approval of the chief engineer, who is charged with the administration of this act, is required to acquire appropriation rights to water for other than domestic uses. Without state agreement, it is unlawful to divert state waters away from a person who has a prior right to use such waters. The date of the appropriation right is determinative of rights to use available water. When conflicting uses for different purposes exist, an order of use-preference must be followed. Water permits are appurtenant to the land for which the permit is granted, but the place of use may be changed with state approval and without a loss of priority. Permit application requirements and procedures for processing the same are detailed. Also covered in the act are actions for compensation to common law claimants with vested rights, abandonment of water rights, and procedures for appealing decisions of the state engineer to the district court. (Josepher-Florida)
W78-03410

STATE WATER PLAN (KANSAS).
Kan. Stat. Ann. secs 82a-901 thru -946 (1969), as amended, (Supp. 1975).

Descriptors: *Water resources development, *Kansas, *Water policy, *Watershed management, *Water supply development, Legislation, Waste dumps, Waste disposal, Sewage disposal, Reservoirs, Flood control, Beneficial use, Water quality standards, Water quality control, Administration, Water law, State governments, Conservation, Water management(Applied), Water supply, Water users, Water control.

Kansas has enacted legislation requiring development of a comprehensive state water resources plan. Under the plan, the state will assist in the development of conservation storage in reservoir projects, help public corporations of the state develop flood control and water conservation projects, encourage payment from persons receiving direct benefit therefrom. Public hearings shall be held to consider the plan. Kansas' long range goals and objectives are outlined, including the number of acre-feet of water which should be developed to meet the state's future water needs. Water quality standards for water in watercourses are proposed. The act includes tables with information about major reservoirs and watershed projects within Kansas. Kansas intends to coordinate state planning with local and national planning and to resolve any conflicts which may arise between state and federal water policies, plans, or projects. (Josepher-Florida)
W78-03411

WATER QUALITY ACT.
N. M. Stat. Ann. secs 75-39-1 thru -12 (1968), as amend, (Supp. 1975).

Descriptors: *Legislation, *Water Quality Act, *New Mexico, *Water permits, *Administrative agencies, Administration, Administrative decisions, Regulation, Pollution abatement, Political aspects, Pollutant identification, Standards, State governments, Water quality standards, Water supply, Pollution abatement, Pollutants, Water rights, Water pollution, Water policy, Water quality, Water quality control.

New Mexico has enacted legislation creating a water quality control commission for the purpose of adopting a comprehensive water pollution prevention and abatement program. Constituent agencies of the state administer regulations of the commission, which is composed of directors of several state departments and a public representative appointed by the governor. Persons who discharge pollutants into state waters may be required to obtain a state permit and to file records reflecting the nature and amount of effluents discharged. Previously issued permits may be terminated or modified. Remedies for violations of New Mexico's Water Quality Act include injunctive relief and fines, with emergency procedures provided to allow for immediate abatement of pollution where necessary. (Josepher-Florida)
W78-03412

HOOKER CHEMICALS AND PLASTICS CORPORATION V. TRAIN (REVIEW OF ENVIRONMENTAL PROTECTION AGENCY'S NEW SOURCE REGULATIONS FOR PHOSPHATE MANUFACTURING INDUSTRY).
537 F2d 639-42 (2d Cir. 1976).

Descriptors: *Industrial wastes, *Chemical industry, *Phosphates, *Federal Water Pollution Control Act, *Effluents, Methodology, Administration, Federal government, Administrative agencies, Technology, Jurisdiction, Industries, Industrial water, Industrial plants, Water quality standards, Water control, Pollutants, Pollution abatement, Regulation, Legal review, Judicial decisions.

Plaintiff chemical companies sought review of Environmental Protection Agency (EPA) guidelines setting effluent limitations for 'new sources' in the phosphate manufacturing industry. The 'New source' regulations for both phosphorus and phosphorus pentasulfide were challenged. 'New sources' are those sources of liquid effluent discharge which are constructed after the EPA's promulgation of applicable regulations. The court of appeals found unsupportable the EPA's post hoc contention that its new source regulations were based upon 'available' or 'demonstrated' technology, as required by the 1972 Federal Water Pollution Control Act Amendments. The court noted that it had previously set aside the 1983 effluent limitation guidelines for phosphorus producers because it had not been sufficiently proven that the technology on which the regulations were based was available. Since the 'new source' regulations had been promulgated with the same data base, the court felt compelled to set them aside also. The court further noted that the record did not reflect a sufficient consideration by the EPA of the cost aspects for the installation of the purportedly available technology. Therefore, the court remanded the guidelines at issue for further proceedings by the EPA. (Josepher-Florida)
W78-03413

HOOKER CHEMICALS AND PLASTICS CORPORATION V. TRAIN (FEDERAL COURT REVIEW OF ENVIRONMENTAL PROTECTION AGENCY GUIDELINES).
537 F2d (2d Cir 1976). 20 p.

Descriptors: *Industrial wastes, *Chemical industry, *Phosphates, *Federal Water Pollution Control Act, *Federal jurisdiction, Effluents, Regulations, Federal government, Methodology, Administration, Administrative agencies, Technology, Industries, Water quality standards, Water pollution, Pollutants, Jurisdiction, Industrial wastes, Water quality control, Judicial decisions, Legal review.

Plaintiff chemical companies sought review of Environmental Protection Agency (EPA) regulations setting effluent limitation guidelines for the phosphate manufacturing industries. The Second Circuit Court of Appeals ruled that it had jurisdiction to review the EPA regulations, denying the plaintiffs' contention that original review of EPA regulations must be in the District Court. The Court approved of the general methodology employed and the factors considered by the EPA in the promulgation of its regulations. It found that tha EPA's notice of proposed rulemaking and subsequent publication of rules was in accord with the Administrative Procedure Act. However, because the EPA had failed to show the feasibility of the technology used in arriving at the specific regulations in question, had failed to consider certain variable weather conditions affecting experimental data, and had not sufficiently justified certain guidelines at the time of their promulgation, the Court set aside the regulations remanding them to the EPA for further consideration. (Josepher-Florida)
W78-03414

ARTESIAN WELLS.
NM Stat Ann secs 75-12-1 thru -12 (1968), as amended, (Supp 1975).

Descriptors: *Reservoir storage, *Artesian wells, *Well permits, *Well regulations, *Water management(Applied), Appropriation, Reservoir leakage, Reservoir operation, Reservoirs, Reservoir design, Wells, Well casings, Pipes, Piping systems, Conduits, Water policy, Water resources, Underflow, Beneficial use, Water conservation, Water supply, Water rights, Ditches.

New Mexico has enacted legislation defining 'artesian wells' to be artificial wells which derive their water supply from any artesian stratum or basin. The drilling, repairing, plugging, and casing of wells are made subject to state regulation. Before proceeding with any such work, a bond must be posted with the state to cover the state's cost of conforming potential breaches of permit provisions. In addition, contractors must file drilling records which reflect the type of casing used, the character of the penetrated strata, the depth of the well, and the amount of flow from the well casing. This article also defines 'waste' as escaping well water which is not being put to a beneficial use. A loss of more than twenty percent of the water being stored or conducted through ditches constitutes waste, which is a public nuisance and a misdemeanor. To further prevent waste, reservoir capacity is limited to the amount of water which can accumulate over a period of forty-eight hours at a continuous maximum flow. Finally, artesian water used to water stock must be controlled to prevent waste from conducting pipes. (Josepher-Florida)
W78-03415

AMERICAN IRON AND STEEL INSTITUTE V ENVIRONMENTAL PROTECTION AGENCY (JURISDICTION FOR JUDICIAL REVIEW OF ENVIRONMENTAL PROTECTION AGENCY REGULATIONS).
543 F.2d 521-29 (3d Cir. 1976).

Descriptors: *Federal Water Pollution Control Act, *Effluents, *Federal jurisdiction, *Administrative agencies, *Industrial wastes, Intakes, Judicial decisions, Water pollution sources, Constitutional law, Permits, Waste water(Pollution), Environmental control, Federal government, Water pollution control, Iron, Water law, Water pollution treatment, Steel, Legal review, Pollutants.

Petitioner trade association sought review of certain Environmental Protection Agency regulations. Although the regulations require effluent limitations to be expressed in gross terms, adjustments may be made for some individual point sources with pollutants in the intake water. The petitioner argued that all effluent limitations should be expressed in net terms, i.e. all pollutants present in the intake water should be substracted from the gross amounts of pollutants discharged after processing, with only the net discharge regulated. Although the Federal Water Pollution Control Act Amendments granted courts jurisdiction to review regulations setting effluent limitations, the Third Circuit Court of Appeals held that the Net Gross Regulations were primarily a permit issuance procedure and were neither effluent limitations nor effluent guidelines subject to judicial review. The court agreed that the Net-Gross Regulations did not prescribe specific number limitations for specific pollutants nor did they list factors to be considered in determining point source control measures. The court said that review of the regulations would be proper as applied to a permit applicant, but the petitioner had not applied for a permit. (Cocheu-Florida)
W78-03416

A STUDY OF FEASIBILITY OF STATE WATER USER FEES FOR FINANCING WATER DEVELOPMENT,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 6C.
W78-03425

PROCEDURES FOR REVIEWING ENVIRONMENTAL IMPACT ASSESSMENTS AND STATEMENTS FOR CONSTRUCTION PROJECTS,
Construction Engineering Research Lab. (Army), Champaign, IL.
For primary bibliographic entry see Field 6G.
W78-03444

INTER-STATE WATER DISPUTES: A CASE STUDY OF INDIA,
Methodist Coll., Fayetteville, NC. Dept. of Economics.
S. Gautam.
Water Resources Bulletin, Vol. 12, No. 5, p 1061-1070, October 1976. 4 ref.

Descriptors: Interstate rivers, *Regulation, *Legislation, *Water resources development, Political aspects, Irrigation, *Water rights, *India, Tribunals, River boards, Developing countries, *Interstate water disputes(India).

During the last 27 years of independence, a large number of interstate water disputes developed over the use of rivers. More disputes were born during this short period than in the earlier 200 years of irrigation development, and so far none of the disputes has been permanently solved. The major rivers of India are all interstate, and this is one of the more important reasons why some of them are not yet fully developed for irrigation or power production. The Union Government has thus far set up only three tribunals to adjudicate interstate disputes. But the problems do not end simply by setting up the tribunals; in practice, they have proved to be a delaying process: None of the tribunals has been successful in settling any dispute in the long years of their existence. Also there is no codified law prescribing rights. However, the notion of 'equity' has come to prevail, restraining the upper states from drawing such quantities of water as would injure the interests of the lower states. Though the general principle of equitable apportionment had been advocated many times, each contending state had given this principle an interpretation that suited its own needs. The basic guideline to follow must be to harness the rivers not for the benefit of a particular state, but rather for the maximization of agricultural, industrial, and navigational potential in the areas served by the rivers. (Bell-Cornell)
W78-03646

WATER-ENERGY CONFLICTS IN MONTANA'S YELLOWSTONE RIVER BASIN,
Montana State Dept. of Health and Environmental Sciences, Billings. Bureau of Water Quality.
J. L. Thomas, and R. L. Anderson.
Water Resources Bulletin, Vol. 12, No. 4, p 829-842, August 1976. 2 fig, 14 ref.

Descriptors: *Water resources development, *Energy, *Montana, Planning, Effects, Water quality, Water policy, Strip mines, River basins, Water utilization, Water rights, Water supply, *Federal-state water rights conflicts, *Conflicts, Coal mining, *Yellowstone River basin(Mont).

The abundant, high-quality waters of the Yellowstone River Basin have fostered a strong agricultural-based economy in eastern Montana. The region also contains the nation's largest strippable coal reserves. Numerous conflicts have developed around the mining of coal and in-state conversion of coal into electricity and synthetic fuels--processes that require large volumes of water. Competition for water among industrialists, agriculturalists, and others is a critical state issue. Probable effects of increased water diversions, the nature of water-energy conflicts, and state efforts to control development are discussed. (Bell-Cornell)
W78-03649

THE COMPLETE DRAINAGE PROGRAM--MORE THAN AN ORDINANCE,
Hydrocomp, Inc., Atlanta, GA.
T. N. Debo.
Water Resources Bulletin, Vol. 12, No. 1, p 109-121, February 1976. 4 ref.

Descriptors: *Drainage programs, *Urban drainage, *Flood control, *Regulation, Evaluation, Land use, Erosion control, *Drainage ordinances, Urban planning.

An ever increasing number of communities throughout the nation are being forced by Federal legislation and local pressures to adopt land use and control measures related to drainage and flood protection. In many instances, communities are hastily adopting ordinances and regulations which later prove difficult to administer and enforce. In addition, many of these ordinances and regulations are not producing the results originally anticipated. This paper discusses the basic elements of a drainage ordinance and evaluates the role of the ordinance in a comprehensive drainage program. This evaluation is based on the results of a two year study of drainage programs in five urban areas which produced a model urban drainage ordinance and recommendations on the administration of the oridnance. Personal interviews and local documents are used as the data in formulating conclusions and recommendations. (Bell-Cornell)
W78-03650

A LEGAL ORDER FOR THE OCEANS, II,
A. W. Smith.
National Parks and Conservation Magazine, Vol 51, No 2, p 2, 31, February 1977.

Descriptors: *Water pollution control, *Continental shelf, *Law of the Sea, *International law, *International waters, Water pollution, Oceans, Continental slope, Water law, Oil pollution, Coasts, Bodies of water, Treaties, Foreign waters, Legal aspects, Commercial fishing, Fishing, Conferences, Water quality, Legislation.

The revised single negotiating text presented to the United Nations Conference on the Law of the Sea covers many central issues of international water law. The text must, however, be improved in the areas of living resources of the seas and oceanic pollution. Strong regulation of ocean fisheries would protect them as a food supply. Use of a population test instead of a yield test for the harvesting of food fish would provide protection for associated and dependent species. The problem of oceanic pollution requires international information and cooperation, as well as personnel and money. Pollution from deep seabed mining should be more strictly controlled as should pollution from ships at sea. To avoid unreasonable demands on tankers by a single coastal country, there should be a provision in any treaty against unilateral legislation which is arbitrary, discriminatory or retaliatory in nature; interpretation should be done by an adequate judicial system. The proposed unilateral extension of United states controls to a 200-mile pollution control zone follows the destructive pattern of the 200-mile fishery zone and may reduce the chance of achieving international goals. (Maass-Florida)
W78-03691

HOLLINGS CALLS FOR DEPARTMENT OF ENVIRONMENT AND OCEANS,
Senate, Washington, DC.
E. F. Hollings.
Sea Technology, Vol 17, No 7, p 15-18, July 1976.

Descriptors: *Environmental control, Water resources development, *Planning, *Coordination, *Oceans, Environment, Environmental effects, Government, Legal aspects, Regulation, Administrative agencies, Management, Control, Comprehensive planning, Federal government, Mineral resources, Legislation, Sea water, Shore protection.

The lack of a comprehensive ocean policy in the United States can be attributed to our lateness in recognizing the challenge of the sea due to emphasis placed on the space program, and to our haphazard response once the problem was recognized. Twenty-one ocean activities in the United States are scattered among six departments and five agencies without coordination. The National Oceanic and Atmospheric Administration instituted in 1970 had no policies or specific directives and failed to assume the coordinating role formerly held by the Marine Sciences Council. Senator Hollings supports the creation of a Cabinet-level agency, a Department of Environment and Oceans, offering authority, flexibility and visibility in these matters. The mission of the department would be to promote, regulate and manage ocean resources as part of the total environment. Additionally, the department would encompass the Environmental Protection Agency, the Coast Guard, the Geological Survey, and major National Science Foundation programs. It would coordinate these activities with new regulatory authority. Some programs of the Army Corps of Engineers, the Fish and Wildlife Service, the Bureau of Land Management and the Bureau of Reclamation would also be included. (Mulligan-Florida)
W78-03692

ADMINISTRATION GIVES VIEWS ON PROPOSED LEGISLATION ON DEEP SEABED MINING,
Department of State, Washington, DC. Office of Ambassadors at Large.
E. L. Richardson.
Department of State Bulletin, Vol 76, No 1978, p 524-27, May 23, 1977.

Descriptors: *Law of the Sea, *International law, *International waters, *Treaties, *Mining, Foreign waters, Mineralogy, Exploration, Oceans, Legislation, Governments, Regulation, Environment, Beds, Ownership of beds, Legal aspects, Political aspects, Federal government, United States.

Proposed legislation on deep seabed mining has the potential to affect negotiations at the upcoming Law of the Sea Conference. Consequently, the Administration does not support immediate legislation concerning deep seabed mining. It is felt that such legislation would act as a prior restraint on Administration's efforts to achieve a comprehensive treaty. However, assuming that international agreement is not forthcoming, the Administration does recognize the possible necessity for interim legislation to assure industry that its efforts to mine the deep seabed will not be negated by future international agreements. To that end the Administration proposes that such legislation be subject to a final comprehensive treaty, that it affirm our legal position on deep seabed mining, that it require United states operators to pay reasonable regard to other marine activities and the environment, that it provide for duty-free entry of recovered minerals, and that it provide for harmonizing with other nations' legislation. The Administration does not think the interim legislation should include exploration regulations, obligations to reimburse for losses caused by the treaty, or processing requirements. (Curran-Florida)
W78-03693

UNITED STATES DISCUSSES ITS PREPARATIONS FOR THE UNITED NATIONS WATER CONFERENCE,
Select Committee on Natural Resources (U.S. House), Washington DC.
J. M. Meyerson.
Department of State Bulletin, Vol 76, No 1967, p 203-05, March 7, 1977.

Descriptors: *Water resources development, *International waters, *United Nations, *United States, Resources development, Legal aspects, Resources, Natural resources, Oceans, Shores, Sea water, Governments, Foreign countries, Comprehensive planning, Political aspects, Water allocation(Policy), Water policy, Water supply, Water management(Applied).

Federal and state governments, private industry, and the academic community in this country are involved in preparation for United States participation in the United Nations Water Conference. Their efforts are coordinated by a national committee representing a variety of water interests. The United States has contributed specialists to expert panels convened to address topics of community water supply and food-water relationships, and has submitted 17 thematic papers on topics ranging from integration of water management into national planning to control of toxic substances. Because the global problems of water quantity and water quality are so urgent, it is vital that the conference focus on water resources policies and problems of water resources management, postponing discussion of technical aspects to other available forums. In addition, it is important to insure that this conference is substantively connected to other world conferences devoted to different but related aspects of natural resources management, particularly the United Nations Desertification Conference. The United States representative suggests that introduction of localized political issues into a global conference is counterproductive, and recommends budgetary restraints in conference planning. (Mulligan-Florida)
W78-03694

6F. Nonstructural Alternatives

NORTHERN ST. JOHNS COUNTY COASTAL MANAGEMENT PLAN,
Florida Coastal Engineers, Inc., Jacksonville.
E. J. Olsen.
Shore and Beach, Vol. 42, No. 2, p 29-35, October 1974.

Descriptors: *Florida, *Dunes, *Shore protection, *Beaches, *Zoning, Land management, Water law, Non-structural alternatives, Land use, Land development, Sands, Legislation, Beach erosion, Dune sands, Coastal structures, Seashores, Legal aspects, Coasts, Construction, Regulation.

Florida public policy for long range coastal management plans includes preservation of beach dunes to protect both private land owners and the public. The article focusses on one county's efforts to utilize coastal zoning to protect beach dunes from increased development along the shoreline. The coastal construction setback line was to take into consideration wind and wave action. Since regulation of the type of construction leeward of the setback line was necessary, this was adopted into the Coastal Management Plan. Under this plan three zoning categories were created to protect beach-dune interfaces. No construction is permitted in the Preservation Zone from the crest of the primary dune line to the Mean High Water line. Pole construction, utilizing poles or supports but no excavation, is allowed in the Conservation Zone. Regulation is accomplished through deed restrictions since the state has no jurisdiction landward of the setback line. Development zones permit more relaxed usage, but still require protection of the dune interface as its primary objective. Serving as a model program for the rest of the state, the Construction Setback Line Program benefits the environment while not severely hindering development. (Cocheu-Florida)
W78-03349

RESERVED WATER RIGHTS - A SOLUTION IS NEEDED,
Idaho Dept. of Water Resources, Boise.
For primary bibliographic entry see Field 6E.
W78-03353

AGRICULTURAL BENEFIT ASSESSMENT FROM FLOOD CONTROL,
Illinois State Water Survey, Urbana.
K. P. Singh.
In: Environmental Aspects of Irrigation and Drainage. Proceedings of A Specialty Conference,

University of Ottawa, Ontario, July 21-23, 1976. Irrigation and Drainage Division, American Society of Civil Engineers, New York, N.Y., p 264-277, 1976. 1 fig, 3 tab, 8 ref, 2 append.

Descriptors: *Flood control, *Benefits, *Assessment, *Methodology, *Computer programs, *Flood damage, Agriculture, Dams, Reservoir operation, Land use, Unit costs, Gaging stations, Farming, Operations research, Evaluation, Equations, Programs, Flow, Optimization, Flow release, Crop yield, Production investment, Flood minimization, Benefit maximization.

Needed is a methodology for evaluating flood damages or benefits as an integral part of the overall system, a methodology which is rational, precise, and programmable as an efficient and compact computer subroutine. Three available methods is use for flood control benefit assessment are described as to their advantages and shortcomings: (1) Frequency or Flood Peak-Damage Integration method; (2) Historical Series methods; and the Flood Hydrograph-Damage Integration method. Presented is a methodology which fulfills the aforementioned requirements; it computes flood control benefits that would accrue from individual and recurrent floodings, considering the data on (1) land use and crop yields, (2) sequence of farming operations and their unit costs, (3) loss of direct production investment because of flooding during farming operations, (4) the periods suitable for planting or replanting of crops and substitute crops, (5) crop loss due to flooding during the growing season, (6) partial crop loss during the harvesting season. In its concise and efficient form, the methodology helps greatly in developing an optimal operation scheme. Agricultural benefits can be followed from week to week and system operation parameters modified in view of the information obtained from successive computer runs. This methodology has been used in deriving an optimal joint operation of a two-lake system in south-central Illinois. The expected annual flood control benefit of $462,300 with the present operating policy can be increased to $627,600 with the derived optimal policy. (Bell-Cornell)
W78-03634

6G. Ecologic Impact Of Water Development

'INNOVATIVE' ASSESSMENT TECHNOLOGY ALLOWS MORE ACCURATE PREDICTION.
For primary bibliographic entry see Field 5C.
W78-03209

AN AUTOMATED SYSTEM FOR COLLECTING, PROCESSING, AND DISPLAYING ENVIRONMENTAL BASELINE DATA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
For primary bibliographic entry see Field 7C.
W78-03256

PRE-SCREENING FOR ENVIRONMENTAL HAZARDS--A SYSTEM FOR SELECTING AND PRIORITIZING CHEMICALS.
Little (Arthur D.), Inc., Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03267

GEOGRAPHIC AREAS OF PARTICULAR CONCERN.
Delaware Coastal Zone Management Program, Dover.
For primary bibliographic entry see Field 2L.
W78-03273

ECOSYSTEMS AND RESOURCES OF THE MASSACHUSETTS COAST,
Massachusetts Office Coastal Zone Management, Boston. Inst. for Man and Environment.
For primary bibliographic entry see Field 2L.
W78-03274

UNIQUE ECOLOGICAL FEATURES OF THE LOUISIANA COAST.
Burk and Associates, Inc., New Orleans, LA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 812, Price codes: A05 in paper copy, A01 in microfiche. Report to the Louisiana State Planning Office, Coastal Resources Program, June 1976, 77 p.

Descriptors: *Louisiana, *Ecology, *Baseline studies, *Resources, Coasts, Habitats, Wetlands, *Resource assessment, Coastal zone management, Environmental units, Nursery ground, Endangered species.

Twenty three categories of unique ecological features of the Louisiana coast are described. These features have been divided into zoological, botanical and geological components. A unique ecological feature is defined as an area or a resource that is either (1) critical habitat for rare or endangered species; (2) of extremely high biological productivity; (3) of vital importance as a nesting, feeding, wintering or spawning area for fish and wildlife; (4) a rare or unusual occurrence for a species that may be near the limits of its range; (5) vital to the maintenance of a coastal ecological process; (6) a unique physiographic feature or (7) of exceptional recreational value. For each feature, the location, number, approximate size or acreage, unique importance and source of information is presented. (Sinha-OEIS)
W78-03284

IMPACTS OF OUTER CONTINENTAL SHELF ACTIVITIES: LAFOURCHE PARISH, LA,
Louisiana State Univ., Baton Rouge. Center for Wetland Resources.
For primary bibliographic entry see Field 5C.
W78-03288

THE UNITED NATIONS ENVIRONMENT PROGRAM: THE MEDITERRANEAN CONFERENCES,
For primary bibliographic entry see Field 6E.
W78-03336

ENVIRONMENTAL REGULATION OF OFFSHORE EXPLORATION, PRODUCTION, AND DEVELOPMENT,
Atlantic Richfield Company, Anchorage, AK.
For primary bibliographic entry see Field 5G.
W78-03337

ENVIRONMENTAL PROBLEMS ONSHORE,
Shell Oil Co., Houston, TX. Corporate Law Dept.
For primary bibliographic entry see Field 5G.
W78-03338

PREPARATION OF ENVIRONMENTAL IMPACT STATEMENTS FOR NEW SOURCE NPDES PERMITS.
Environmental Protection Agency, Washington, DC.
Federal Register, Vol. 42, No. 7, p. 2450-59, January 11, 1977.

Descriptors: *Permits, *Administrative agencies, *Environmental effects, *Regulation, *Federal Water Pollution Control Act, Legal aspects, Federal government, Administrative decisions, Water law, Project planning, Administration, Governmental interrelations, Alternate planning, Management, Discharge(Water), Effluents, Pollutants, Water pollution control, Water pollution effects.

The Environmental Protection Agency (EPA) has instituted regulations requiring environmental impact statements prior to the issuance of new source National Pollutant Discharge Elimination System (NPDES) permits. The regulation applies only to EPA-issued permits and not to approved state permit programs. Potential new source applicants must submit new source and environmental questionnaires to the responsible EPA official. An initial determination of whether the facility is a new source will be made and, if so, an environmental impact assessment must be submitted. An environmental review of the assessment information follows. If a significant environmental impact may occur and adverse impacts cannot be eliminated by changes in the proposed project, an environmental impact statement (EIS) shall be prepared. If no such impact is anticipated, or if changes can eliminate adverse effects, a negative declaration shall be issued and no EIS is required. The regulations contain explicit guidelines for determining whether an EIS is necessary, procedures and timing deadlines for the preparation of an EIS and standards for the form and content of an EIS. (Moorhouse-Florida)
W78-03370

PROCEDURES FOR REVIEWING ENVIRONMENTAL IMPACT ASSESSMENTS AND STATEMENTS FOR CONSTRUCTION PROJECTS,
Construction Engineering Research Lab. (Army), Champaign, IL.
R. K. Jain, N. L. Drobny, and S. Chatterjee.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A015 020, Price codes: A02 in paper copy, A01 in microfiche. Technical Report E-73, August 1975. 24 p, 2 fig, 3 tab, 3 ref.

Descriptors: *Projects, *Evaluation, *Analytical techniques, *Environmental effects, Economics, Land appraisals, Analysis, Project planning, Appraisals, Cost analysis, Estimating, Administrative agencies, Forecasting, Federal government, Economic impact, Social impact, Construction, Cost-benefit analysis, Costs, Benefits, Project feasibility.

A comprehensive reviewing procedure has been established to assist administrative and staff personnel in review of environmental impact assessments and statements (EIA/EIS) of construction projects. The procedure allows the reviewer to become familiar with the project, ascertain the completeness of the assessment or statement, and determine the validity and accuracy of the information. The mechanics of the review procedure include four interrelated indices; project screening factors; factor rating criteria; project screening criteria; and EIS review criteria. By assigning point values in relation to the indices, various projects may be rated as ones of small, medium or high impact. The report includes an example illustrating use of the procedure to review an EIS for a military family housing project. The methodology will undoubtedly be expanded and refined as experience is gained from applicaton of this procedure to actual projects. (Moorhouse-Florida)
W78-03444

THE ENVIRONMENTAL EFFECTS OF USING COAL FOR GENERATING ELECTRICITY,
Argonne National Lab., IL.
A. J. Dvorak, C. D. Brown, E. H. Dettman, R. A. Hinchman, and J. D. Jastrow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 237, Price codes: A11 in paper copy, A01 in microfiche. Report No. NUREG-0252, June 1977. 221 p, 33 fig, 63 tab, 639 ref, 7 append. ERDA W-31-109-ENG-38.

Descriptors: *Environmental effects, *Coals, *Electricity, Coal mines, Industrial wastes, Transportation, Storage, Air pollution, Water pollution,

Public health, Toxicity, Pollution abatement, Pollutants, *Emissions, Coal combustion, Pollution control, Occupational health.

Health and ecological effects of the coal cycle are estimated and described as they pertain to generation of electricity by coal combustion. Various operational (siting) and circumstantial (physical and chemical characteristics of coal) assumptions are made to provide a realistic projection of impacts, and the use of a model 1000-MWe coal-fired power plant operating at 70% annual capacity in five major U.S. regions is assumed. The annual coal requirement for each plant is used to quantify impacts and estimates, by region on a yearly basis, are made for land area disturbed by mining, transportation requirements, waste generated from processing, non-airborne wastes produced from coal combustion, by-products from pollution control technology, and airborne emissions with varying pollution control measures. Terrestrial and aquatic impacts associated with each of these estimates are discusses on a regional basis, and occupational and public health impacts are identified and quantitatively estimated, i.e., coal mine accidents, black lung disease, transportation accidents, and toxicity of air pollutants, using worst-case conditions for both short-term and long-term effects where possible. Alternatives to current reclamation and abatement methods are also discussed in light of feasibility and government regulation. Appendices present data on by-products from emission abatement, Federal and State water pollution and reclamation regulations, meteorological dispersion, sulfur dioxide sensitivity groupings for vegetation, and trace element availability, mobility, and toxicity in terrestrial and aquatic ecosystems. (Wares-IPC)
W78-03455

DATA EVALUATIONS AND RECOMMENDATIONS FOR COMPREHENSIVE PLANNING FOR THE YAZOO RIVER BASIN, MISSISSIPPI,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 4A.
W78-03473

ASSESSMENT OF ENVIRONMENTAL IMPACT ON THE AQUATIC ENVIRONMENT WITH LIMITED DATA,
Howard (Charles) and Associates Ltd., Winnipeg (Manitoba).
For primary bibliographic entry see Field 5C.
W78-03639

OUTLET DRAINAGE - AN ASSESSMENT OF ENVIRONMENTAL EFFECTS,
Waterloo Univ. (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 6B.
W78-03640

CANADA COMMITTEE ON ECOLOGICAL (BIO-PHYSICAL) LAND CLASSIFICATION, WORKING GROUP ON LAND/WATER INTEGRATION, PROCEEDINGS OF THE FIRST MEETING, FEBRUARY 17-18, 1977, FRESHWATER INSTITUTE, WINNIPEG, MANITOBA.
Department of the Environment, Hull (Quebec). Lands Directorate.
Lands Directorate, Environment Canada, Ottawa, (1977), 70 p.

Descriptors: *Wetlands, *Systematics, *Classification, *Evaluation, *Future planning(Projected), *Mapping, Census, Survey, Flooding, Coasts, Streams, Streamflow, Channels, *Canada(British Columbia).

The Working Group advises on the feasibility and necessity of a biophysical classification scheme that integrates water with the classification of the surrounding terrain. Focus is on the needs for inland and coastal land-water classification, and their compatibility with existing ecological classification. Two classification systems are discussed: the British Columbia Aquatic System Inventory for mapping stream characteristics and the Churchill-Nelson Shoreline Inventory used to describe and map shorelines in terms of response to flooding by use of profiles showing land zonation (i.e., offshore, beach, backshore slope, uplands) and the significant parameters (plant species, slope) occurrence within each zone. Comparisons and needs of inventory methods for ecological land classification are discussed as well as the need for the exchange of information between active and interested resource survey groups. (Steiner-Mass)
W78-03653

A SELECTED ANNOTATED BIBLIOGRAPHY OF ECONOMIC VALUES OF FISH AND WILDLIFE AND THEIR HABITATS,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W78-03660

COASTAL RECREATION RESOURCES IN AN URBANIZING ENVIRONMENT, SYMPOSIUM, HYANNIS, MASSACHUSETTS, APRIL 12-14, 1976.
For primary bibliographic entry see Field 6B.
W78-03662

WATER CONSERVATION AND POLLUTION CONTROL IN COAL CONVERSION PROCESSES,
Water Purification Associates, Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03685

HOLLINGS CALLS FOR DEPARTMENT OF ENVIRONMENT AND OCEANS,
Senate, Washington, DC.
For primary bibliographic entry see Field 6E.
W78-03692

A CRITICAL EVALUATION OF THE NON-RADIOLOGICAL ENVIRONMENTAL TECHNICAL SPECIFICATIONS - VOL. 2: SURRY POWER PLANT UNITS 1 AND 2,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5C.
W78-03697

7. RESOURCES DATA

7B. Data Acquisition

USE OF REMOTE SENSING IN EVALUATING TURBIDITY PLUMES,
Texas A and M Univ., College Station. Coastal, Hydraulic and Ocean Engineering Group.
For primary bibliographic entry see Field 2L.
W78-03232

FEASIBILITY OF ELECTROMAGNETIC STREAMFLOW MEASUREMENTS USING THE EARTH'S FIELD,
Petro Canada Engineering Ltd., Calgary (Alberta). Dept. of Transportations and Operations.
For primary bibliographic entry see Field 2E.
W78-03242

AN AUTOMATED SYSTEM FOR COLLECTING, PROCESSING, AND DISPLAYING ENVIRONMENTAL BASELINE DATA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
For primary bibliographic entry see Field 7C.
W78-03256

A LABORATORY TECHNIQUE FOR APPRAISING IN SITU SALINITY OF SOIL,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 2G.
W78-03462

A NEW MODEL OF PLANKTON DREDGE FOR COLLECTING SAMPLES OF WATER AND PLANKTONIC ORGANISMS, (IN RUSSIAN),
Azovskii Nauchno-Issledovatelskii Inst. Rybnogo Khozyaistva, Rostov-na-Donu (USSR).
P. M. Voronov.
Gidrobiol Zh 12(6), p 92-94, 1976.

Descriptors: Aquatic animals, Artemia-salina, *Trapping capacity, *Ukraine, USSR(Lake Dzharylgach), *Plankton dredge sampling, *Model studies, Monitoring.

The new plankton dredge is distinguished from others by its air-tightness and simplicity of use. Tests in the collection of Artemia salina in the saline Lake Dzharylgach in the Crimesa (Ukrainian SSR, USSR) showed that the trapping capacity of the new dredge was 1/3 greater than that of Vovk's dredge, but 1.3% less than that of a control net. The new model is recommended for the collection of samples of water and aquatic organisms from different horizons and bodies of water.--Copyright 1978, Biological Abstracts, Inc.
W78-03524

WATER SAMPLER DEVICE,
S. J. Niskin.
U.S. Patent No. 4,037,477, 11 p, 25 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 960, No 4, p 1521, July 26, 1977.

Descriptors: *Patents, *Sampling, *Water sampling, Water analysis, Valves, Water samplers.

A water sampler device has a cylindrical container open at each end with a ball valve mounted at the openings. The valves are adapted to rotate about their axis from an initially closed position when the device is launched into a body of water to prevent the contamination of the container by the surface waters. Upon descending, a water pressure operated valve opens to equalize the pressure inside the container with that of the outside water pressure and causes the simultaneous rotation of the valves to an open predetermined depth at which the sample to be obtained when the valves are rotated again to a closed position. As the sampler device is being brought up to the surface, a further pressure operated valve permits the bleeding of water from within the device to equalize the pressure within the device with that of the surrounding area. (Sinha-OEIS)
W78-03596

CRYOGENIC SEDIMENT SAMPLER,
Department of Agriculture, Washington, DC. Office of the Secretary. (Assignee).
For primary bibliographic entry see Field 2J.
W78-03601

TRACKING POLLUTANTS FROM A DISTANCE,
Environmental Protection Agency, Las Vegas, NV. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W78-03670

PHOTOGRAMMETRY, WATER QUALITY, SAFETY APPURTENANCES, AND SHOULDER DESIGN.
Transportation Research Board, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-03676

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME I,
Kansas Univ./Center for Research, Inc., Lawrence.
R. K. Moore, J. P. Claassen, R. L. Erickson, R. K. T. Fong, and B. C. Hanson.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA-CR-5246(Vol 1), N77-16421, Price codes: A06 in paper copy, A01 in microfiche. Report No. RSL TR 295-3, Vol. I, June 1976. 92 p, 61 fig, 6 tab, 25 ref. NAS 5-22384.

Descriptors: *Radar, *Remote sensing, *Water resources, Soil water, Hydrologic cycle, Snow, Lakes, Surface waters, Rivers, Running waters, Ice, Data processing, *Reviews.

Objectives were the determination of the state-of-the-art for radar measurement of soil moisture, snow, standing and flowing water, and lake and river ice; determination of required spacecraft radar parameters; study of synthetic aperture radar systems to meet these parametric requirements; and study of techniques for on board processing of the radar data. Significant new concepts included: scanning synthetic aperture radar (SCANSAR) to achieve wide swath coverage; single sideboard radar; and comb filter range sequential, range offset synthetic aperture radar processing. The state-of-the-art is good for measurement of soil moisture and standing water, fair for measurement of lake ice, and meager for measurement of snow, river ice, and flowing water. The feasibility for immediate development of a spacecraft water resources SCANSAR has been established, and numerous candidates for the onboard processor have been examined with no conclusive selection. Volume I provides a summary of the program and study elements, a summary of the state-of-the-art of radar capabilities, and an outline of water resources mission requirements. (See W78-03683 and W78-03684) (Wares-IPA)
W78-03682

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME II,
Kansas Univ./Center for Research, Inc., Lawrence.
R. K. Moore, J. P. Claassen, R. L. Erickson, R. K. T. Fong, and B. C. Hanson.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA-CR-5246(Vol II), N77-16422, Price codes: A06 in paper copy, A01 in microfiche. Report RSL TR 295-3, Vol. II, June 1976. 110 p, 47 fig, 16 tab, 19 ref. NAS 5-22384.

Descriptors: *Radar, *Remote sensing, *Water resources, Soil water, Hydrologic cycle, Snow, Lakes, Surface waters, Rivers, Running waters, Ice, Data processing, *Reviews.

Objectives were the determination of the state-of-the-art for radar measurement of soil moisture, snow, standing and flowing water, and lake and river ice, determination of required spacecraft radar parameters; study of synthetic aperture radar systems to meet these parametric requirements; and study of techniques for on board processing of the radar data. Significant new concepts included: scanning synthetic aperture radar (SCANSAR) to achieve wide swath coverage; single sideboard radar; and comb filter range sequential, range offset synthetic aperture radar processing. The feasibility for immediate development of a spacecraft water resources SCANSAR has been established, and numerous candidates for the on-board processor have been examined with no conclusive selection. Volume II contains an explanation of synthetic radar analysis and processor techniques, with a detailed description of the SCANSAR concept, parameters, system requirements, processor requirements, motion compensation, power, and size. (See also W78-03682) (Wares-IPA)
W78-03683

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME III,
Kansas Univ./Center for Research, Inc., Lawrence.
R. K. Moore, J. P. Claassen, R. L. Erickson, R. K. T. Fong, and B. C. Hanson.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-16423(Vol III), Price codes: A05 in paper copy, A01 in microfiche. Report RSL TR 295-3, Vol. III, June 1976. Contains RSL TM 295-11, RSL TM 295-5, and RSL TM 291-4. 98 p, 31 fig, 5 tab, 81 ref, 4 append. NAS 5-22384.

Descriptors: *Radar, *Remote sensing, *Water resources, Soil water, Hydrologic cycle, Snow, Lakes, Surface waters, Rivers, Running waters, Ice, Data processing, *Reviews.

Objectives were the determination of the state-of-the-art for radar measurement of soil moisture, snow, standing and flowing water, and lake and river ice; determination of required spacecraft radar parameters; study of synthetic aperture radar systems to meet these parametric requirements; and study of techniques for on board processing of the radar data. The state-of-the-art is good for measurement of soil moisture and standing water, fair for measurement of lake ice, and meager for measurement of snow, river ice, and flowing water. Volume III contains four appendices which are technical reports on state-of-the-art of: radar and radio-meter measurement of soil moisture (RSL TM 295-6), radar measurement of snow (RSL TM 295-11), radar detection of water bodies (RSL TM 295-5), and radar monitoring of lake/river ice (RSL TM 291-4). (See also W78-03682) (Wares-IPA)
W78-03684

7C. Evaluation, Processing and Publication

AN AUTOMATED SYSTEM FOR COLLECTING, PROCESSING, AND DISPLAYING ENVIRONMENTAL BASELINE DATA,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Mobility and Environmental Systems Lab.
H. W. West, and H. M. Floyd.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 359, Price codes: A05 in paper copy, A01 in microfiche. Technical Report M-76-11, November 1976. 94 p, 40 fig, 4 tab, 1 append.

Descriptors: *Instrumentation, *Sampling, *Equipment, *Environment, Automation, Data collections, Data processing, Information retrieval, Air temperature, Water temperature, Solar radiation, Winds, Rainfall, Evaporation, Water levels, Hydrogen ion concentration, Soil temperature, Turbidity, Dissolved oxygen, Gages, Gaging stations, Water quality.

A system for automated collecting, processing, and displaying of environmental baseline data was described. The functions of the system, consisting of data collections with an automated field station, data processing, and data display options, were discussed. Also included were descriptions of the environmental sensors that are being used with the field station. Data that were obtained with the sytem at 15-, 30-, and 60-min sampling intervals over a period of several months at Pine Bluff Arsenal, Arkansas; Fort Carson, Colorado; Fort McClellan, Alabama; Upper Blakely Island near Mobile, Alabama; and Satartia, Mississippi, were analyzed. Example environmental data were presented in computer formats available with the system. An estimated cost (1976) of the automated field station and selected array of sensors was provided (Appendix A). (Sims-ISWS)
W78-03256

THE IMPACT OF LAND USE CHANGE ON THE GROUND WATER RESOURCES OF THE BOZEMAN, MONTANA AREA,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 4B.
W78-03427

USER HANDBOOK FOR THE ALLOCATION OF COMPLIANCE MONITORING RESOURCES,
Systems Control, Inc., Palo Alto, CA.
For primary bibliographic entry see Field 5G.
W78-03458

OBJECTIVE ANALYSIS AND CLASSIFICATION OF OCEANOGRAPHIC DATA,
National Oceanic and Atmospheric Administration, Washington, DC. Center for Experiment Design and Data Analysis.
For primary bibliographic entry see Field 2L.
W78-03470

DATA EVALUATIONS AND RECOMMENDATIONS FOR COMPREHENSIVE PLANNING FOR THE YAZOO RIVER BASIN, MISSISSIPPI,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Environmental Effects Lab.
For primary bibliographic entry see Field 4A.
W78-03473

LAKE ONTARIO BEGINNING-OF-MONTH WATER LEVELS AND MONTHLY RATES OF CHANGE OF STORAGE,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 2H.
W78-03474

WINTER SNOW-COVER MAPS OF NORTH AMERICA AND EURASIA FROM SATELLITE RECORDS, 1966-1976,
National Environmental Satellite Service, Washington, DC.
M. Matson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 393, Price codes: A03 in paper copy, A01 in microfiche. Report No. NOAA-TM-NESS-84, March 1977. 31 p, 43 fig, 3 tab, 2 ref.

Descriptors: *Snow cover, *Mapping, *Remote sensing, *Satellites(Artificial), Monthly, Snow, Ice, Data collections, *Maps, Climatology, *Northern Hemisphere.

Weekly snow and ice cover charts of the Northern Hemisphere based on satellite data were averaged to create monthly mean snow cover maps of North American and Eurasia for the months of December through March 1966-76. A 10 year mean snow cover map for each winter month also was prepared. Included on each monthly mean winter snow cover map was a month-by-month analysis of all 10 years of data. (Sims-ISWS)
W78-03482

WATER TABLE MAPPING USER'S MANUAL,
Nevada Univ., Reno. Desert Research Inst.
C. L. Carnahan.
Available from the National Technical Information Service, Springfield, VA 22161 as NVO-1253-8, Price codes: A05 in paper copy, A01 in microfiche, Report No. NVO-1253-8, January 1976. 90 p, 2 fig, 3 ref, 1 append. ERDA AT(29-2)-1253.

Descriptors: *Water table, *Mapping, *Model studies, *Computer programs, Computer models,

Input-output analysis, Publications, Computers, Input parameters.

Procedures were given for use of an empirical water table mapping routine utilizing the CDC 6400 digital computer located at the University of Nevada System's Computer Center. Detailed instructions were provided for the program sequences to be used in initial simulation of a water table and in updating an existing simulation. (Visocky-ISWS)
W78-03484

AGRICULTURAL BENEFIT ASSESSMENT FROM FLOOD CONTROL,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 6F.
W78-03634

MODELS FOR SCHEDULING RELEASES FROM MULTIRESERVOIR SYSTEMS: A STATE-OF-THE-ART REVIEW,
Acres Consulting Services Ltd., Niagara Falls (Ontario).
For primary bibliographic entry see Field 4A.
W78-03637

CANADA COMMITTEE ON ECOLOGICAL (BIO-PHYSICAL) LAND CLASSIFICATION, WORKING GROUP ON LAND/WATER INTEGRATION, PROCEEDINGS OF THE FIRST MEETING, FEBRUARY 17-18, 1977, FRESHWATER INSTITUTE, WINNIPEG, MANITOBA.
Department of the Environment, Hull (Quebec). Lands Directorate.
For primary bibliographic entry see Field 6G.
W78-03653

PROBLEM DEFINITION STUDIES ON POTENTIAL ENVIRONMENTAL POLLUTANTS II. PHYSICAL, CHEMICAL, TOXICOLOGICAL, AND BIOLOGICAL PROPERTIES OF 16 SUBSTANCES.
Army Medical Bioengineering Research and Development Lab., Fort Detrick, MD.
For primary bibliographic entry see Field 5A.
W78-03672

ASSESSMENT OF WATER RESOURCES FOR NUCLEAR ENERGY CENTERS,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 3E.
W78-03673

REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES, 1976 EDITION.
National Inst. for Ocupational Safety and Health, Rockville, MD.
For primary bibliographic entry see Field 5A.
W78-03679

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME I,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03682

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME II,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03683

RADAR SYSTEMS FOR THE WATER RESOURCES MISSION. FINAL REPORT, VOLUME III,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 7B.
W78-03684

8. ENGINEERING WORKS

8A. Structures

DESIGN OF ARCH DAMS, DESIGN MANUAL FOR CONCRETE ARCH DAMS.
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402. A Water Resources Technical Publication, Denver, Colorado, 1977, 924 p.

Descriptors: *Arch dams, *Dam design, *Concrete dams, *Spillways, *Analytical techniques, Dam foundations, Hydraulic structures, Design data, Design criteria, Hydraulics, Outlet works, Foundation investigations, Concretes, Concrete control, Analysis, Structural analysis, Diversion, Ecology, Environmental effects, Hydraulic design, Inflow, Flood forecasting, Specifications, Streamflow, Floods, Hydrology.

Instructions, examples, procedures, and standards were presented for use in the design of concrete arch dams. This information is intended to serve as a guide to sound engineering with specialized and technical information that can be readily used in the design of concrete arch dams. Discussions were limited to dams on rock foundations. Subjects discussed in detail included design considerations, design data and criteria, layout and analysis, river diversion, foundation treatment, temperature control of concrete, joints in structures, spillways, outlet works and power outlets, galleries and adits, miscellaneous appurtenances, structural behavior measurements, concrete construction, and ecological and environmental considerations. The manual should be of service to all concerned with the planning and designing of water storage projects, but it cannot relieve the agency or person using it of the responsibility for a safe and adequate design. The limitations stated in the design procedures should be heeded. (See also W74-01058 thru W74-01070, and W77-07151) (Humphreys-ISWS)
W78-03491

CAST-IN-PLACE PIPE USES TRENCH AS FORM.
For primary bibliographic entry see Field 8F.
W78-03494

THE TWIN-TUNNEL CONCEPT.
Civil Engineering, p 45, 47, November, 1977.

Descriptors: *Construction materials, *Sewers, *Conveyance structures, *Operation and maintenance, Linings, Pipes, Sewerage, Corrosion, Flow control, Waste water treatment.

England's National Water Council Standing Committee on Sewers and Water Mains has examined several methods of sewer design and installation with respect to costs for operation and maintenance. The twin-tunnel design concept has been recommended for alleviating problems associated with inspection, cleaning, and renovation of larger-diameter sewers. Although twin tunnels provide hydraulic capacities equivalent to a single, larger diameter sewer, self-cleansing characteristics are increased by the overall reduced radius of the smaller line. Gates can be used to divert waste water flows to a single tunnel if demands are not exceptional, creating a flushing effect in the single tunnel. The ability to divert flows also aids in general maintenance operations. A lower ground cover and gradient is generally possible with the smaller, twin-tunnel design. Disposable linings can be incorporated into twin-tunnel designs to insure water-tightness and inhibit corrosion. Although capital costs may be higher than for a conventional large diameter system, a net overall savings can be realized through reduced maintenance and replacement requirements. (Schulz-FIRL)
W78-03496

8B. Hydraulics

ROUTING OF FLOODS IN RIVER CHANNELS,
Ahmadu Bello Univ., Zaria (Nigeria). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-03240

ONE-DIMENSIONAL WAVE-PROPAGATION ANALYSIS, NEWBURGH LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavement Lab.
W. R. Marcuson, III.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A035 326, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper S-76-25, December 1976. 40 p, 22 fig, 3 tab, 12 ref.

Descriptors: *Seismic waves, *Cohesionless soils, *Soil dynamics, *Ohio River, *Foundation investigations, *Dam foundations, Earthquakes, Soil mechanics, Soil tests, Foundations, Dynamics, Soil liquefaction, Wave propagation, Dynamic response.

The site of the Newburgh Locks and Dam, located on the Ohio River near Evansville, Indiana, was investigated with regard to liquefaction potential. Cyclic triaxial compression tests were performed on remolded specimens of the foundation material at various densities. A one-dimensional wave-propagation analysis was performed for two typical soil profiles under the fixed-weir portion of the structure. As a result of the analysis, it was recommended that a study be initiated to determine the cost and benefits of: (1) removing the top 20 ft of sand below and downstream of the toe of the rock berm and replacing this material with nonliquefiable material; and (2) extending the existing rock berm in the downstream direction. It is believed that such modifications might render the structure stable under earthquake excitation. (Adams-ISWS)
W78-03260

KINEMATICS OF BREAKING WAVES IN THE SURF ZONE: EMPHASIZING ANALYSIS OF IDENTIFIED AND CLASSIFIED BREAKERS,
Naval Postgraduate School, Monterey, CA.
V. S. Hultstrand.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A039 353, Price codes: A04 in paper copy, A01 in microfiche. Thesis for Master of Science in Meteorology and Oceanography, March 1977. 67 p, 22 fig, 2 tab, 20 ref, 3 append. ONR - NR 388-114.

Descriptors: *Water level fluctuations, *Surf, Ocean waves, Coasts, *Wave profiles, *Breakers, Reflected waves, Breaking waves, Kinematics.

Measurements were made of the water level fluctuations and horizontal water particle velocities in breaking waves. The breaking waves were identified and classified. The mean value of the height of breaking to depth of breaking was calculated and found to be 0.86 for a composite of the

waves measured; the mean ratio values for collapsing, plunging and spilling were 0.84, 0.87 and 0.90, respectively. Probabiltiy distributions were plotted for wave heights and horizontal velocities and qualitatively compared with Rayleigh distributions; the wave distributions fit well but velocity did not. The spectra of wave profile and horizontal velocity were calculated and indicated a narrow banded data set. The coherence values between horizontal water particle velocities and wave profile were generally high, indicating that the horizontal particle velocities measured were highly wave-induced. The phase shift at the peak energy frequency was about 40 degrees which suggested the presence of reflected waves. (Sinha-OEIS)
W78-03279

FINITE ELEMENT SIMULATION OF OVERLAND AND CHANNEL FLOW,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2E.
W78-03449

MODEL STUDY OF THE LAKE CHICOT PUMPING PLANT,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
T. Nakato, and J. F. Kennedy.
Available from the National Technical Information Service, Springfield VA 22161 as PB-261 272, Price codes: A07 in paper copy, A01 in microfiche. IIHR Report No. 188, August 1976. 134 p, 51 fig, 2 tab, 4 ref, 2 append.

Descriptors: *Pumping plants, *Forebays, *Flow characteristics, *Trash racks, *Arkansas, *Surges, Hydraulics, Hydraulic models, Outlet works, Velocity, Erosion control, Hydraulic structures, Vortices, Flow separation.

A 1:24-scale laboratory model was constructed of the trapezoidal approach channel, upstream weir, forebay, pump bays and sumps, pump bells, and gravity flow section of the Proposed Lake Chicot Pumping Plant. During pumping operation, the forebay flows approaching the closed gravity bays located in the center of the pumping station are diverted laterally and enter the pump bays with a strong transverse component of velocity. This leads to separation, large captive eddies, and strong lateral nonuniformities in the pump-approach flows in the pump bays. Modified trash-racks, with 12-in deep bars on 6-in centers were found to serve as effective turning vanes and, under most pump operating combinations, to produce pump-approach flows that are acceptably uniform. Those cases were identified in which the pump bay flows in some bays are unacceptable, even with the trash-racks present. Scale effects on the model trash-racks were investigated in 2 idealized model pump bays with scales of 1:10 and 1:24. It was concluded that no undesirable scale effects were present in the 1:24 scale trash-racks in the complete model. Under certain gravity flow conditions, standing waves, were produced in the forebay. Surges did not occur if all gravity sections were open or if the closed sectionswere blocked with stop-logs. Velocity measurements in the forebay delineated the area which should be protected with a concrete apron to avoid scour of the rip rap. It was discovered that scour can occur downstream from the upstream weir when the forebay is bing filled. It was concluded that a protective apron should be installed downstream from the weir. (Adams-ISWS)
W78-03479

SHOALING CHARACTERISTICS OF THE GULF INTRACOASTAL WATERWAY IN TEXAS,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W78-03485

HYDRAULICS AND DYNAMICS OF NORTH INLET, SOUTH CAROLINA, 1974-75,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W78-03489

DESIGN OF ARCH DAMS, DESIGN MANUAL FOR CONCRETE ARCH DAMS.
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
For primary bibliographic entry see Field 8A.
W78-03491

STOCHASTIC MODELS FOR RESERVOIR DESIGN,
Cornell Univ., Ithaca, NY. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 4A.
W78-03631

8C. Hydraulic Machinery

MODEL STUDY OF THE LAKE CHICOT PUMPING PLANT,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 8B.
W78-03479

VARIABLE SPEED PUMPING FOR PROCESS AND MAIN WATER BOOSTING WITH ACCURATE CONTROL.
Water Services, Vol. 81, No. 978, p 488, 493, August, 1977.

Descriptors: *Pumping, *Pumps, *Hydraulic equipment, *Water conveyance, *Flow rates, Flow profiles, Food processing, Municipal wastes, Water treatment, Power operation and maintenance, Waste water treatment.

Fluctuations in fluid pressure in a water or waste water system can be accommodated with variable-speed pumping accomplished with variable-speed motors or multipump additive systems. Applications of variable-speed pumping in England are described. The Peerless Hydroconstant System is used by the brewing industry to compensate for pressure loss as filters clog. The system is also used in water heating systems to compensate for vapor pressure when the water is above the boiling point. Surges in flow which may upset biological treatment processes in a sewage treatment plant can be controlled with the Peerless system. Variable-speed pumping is also used to meet varying demands on water supplies in primary pumping from reservoirs and to augment existing pressure. Power savings resulting from the use of variable-speed pumping are proportional to the amount of time the pump is running at low speeds. (Schulz-FIRL)
W78-03503

BALL VALVES OFFER AN ALTERNATIVE FOR PUMP CHECK DUTY,
Hendon (Harry) and Associates, Birmingham, AL. A. B. Jowers.
Water and Sewage Works, Vol 124, No 11, p 97-98, November, 1977. 1 fig.

Descriptors: *Pumping, *Valves, *Hydraulic equipment, *Pumps, *Hydraulic valves, Sewage treatment, Monitoring, Operation and maintenance, Municipal wastes, Waste water treatment.

A valve on the discharge side of the pump in a sewage treatment plant is normally provided to isolate the pump when it is not in service, to control pumping during start-up and shutdown, and to provide pump-check service in case of pump failure. Changes in fluid velocity within the system can lead to problems associated with water hammer, hydraulic shock, or reverse flow. Problems associated with a cone, check, or metal-seat ball valve normally used for pump-checking have led to the use of rubber-seated ball valves. The rubber ball valves are less costly than cone valves, can provide bubble-tight shutoff in both directions, and are resilient for operation at lower torque. Two applications of the use of rubber-seated ball valves in Tuscaloosa, Alabama, are described. A pump check system is used at the 15.5-mgd waste water treatment plant to prevent primary effluent effluent in the aeration basins from draining back into the wet well. A 30 inch rubber-seat ball valve is provided for each pump and operated by a low-pressure, hydraulic control system which contains a cylinder operator, a differential pressure switch, and a four-way hydraulic valve circuit. Rapid closure of the valves in the event of an emergency power failure is accomplished by a simultaneous de-energizing of all circuits. Pump check systems at the Love water treatment plant in Tuscaloosa are described. (Schulz-FIRL)
W78-03518

TURBINE STANDBY FOR WATER AND SEWAGE PLANTS.
North American Diesel and Gas Turbine Progress, Vol 43, No 11, p 33-34, November, 1977.

Descriptors: *Turbines, *Equipment, *Power operation and maintenance, *Electric power production, Design data, Fuels, Axial flow turbines, Generators, Sewage treatment, Treatment facilities, Waste water treatment.

Standby generator sets have been installed in municipal water and sewage treatment plants to provide adequate power during emergency situations when normal electric power service is interrupted. Solar Turbines International manufactures a range of standby generator sets rated from 900-8600 kW, which are in use at a wide variety of sewage and water treatment facilities in the United States. Four Solar Centaur-turbine-driven sets rated at 3000 kW have been installed at sewage treatment facilities in West Palm Beach, Florida. Provisions were made in the new facility for a fifth standby unit as the plant's capacity incredases. The Centaur turbine consists of a simple-cycle single-shaft engine in a 'cold-end-drive' configuration with an 11-stage axial-flow compressor, single annular combustor, and three-stage rotor assembly. The structural steel base of each turbine, gearbox, and generator and of the package's operating systems allows movement of the complete unit in a single lift. The Quincy sewage treatment plant in Illinois has begun using two Saturn turbine-driven 800-kW sets which use low BTU sludge gas as fuel. Solar standby units are also in operation at facilities within the Los Angeles County Sanitation District. (Schulz-FIRL)
W78-03520

RECESSED IMPELLER PUMP.
Water and Waste Treatment, Vol 20, No 9, p 62, September, 1977.

Descriptors: *Pumps, *Impellers, *Equipment, *Slurries, *Hydraulic transportation, Hydraulic equipment, Design data, Waste water treatment.

Durco Europe has produced a new recessed impeller pump for handling solid, stringy, of fibrous slurries or other materials with high concentrations of suspended solids. The chemical process pump can effectively transport particles as large as 7 cm without clogging. The special design of the Mark II pump includes a recessed impeller vane housed in a single-stage casing. The impeller is out of the main flow of the solids, and back vanes control the stuffing box pressure to keep solids out of the critical seal areas. Problems with shaft deflection and radial bearing loads are eliminated and

uniform hydraulic radial loads are created by the close clearance symmetrical chamber which houses the recessed impeller. A back pull-out design allows removal of the entire rotating assembly without disturbing the motor, casing, and piping. Available capacities range up to 160 cu m/hr with heads up to 100 m and operation at temperatures ranging from -30 to 250C. (Schulz-FIRL)
W78-03529

INCREASE IN STANDBY GENERATION.
Water and Waste Treatment, Vol 20, No 9, p 14-15, September, 1977.

Descriptors: *Pumping, *Power operation and maintenance, *Equipment, *Generators, Electrical equipment, Sewerage, Sewage treatment, Waste water treatment.

Since interruptions in the operation of a sewage pumping station can result in problems at the waste water treatment plant and in possible pollution of the surrounding waterways, standby power generators are coming into more widespread use. Auto Diesels Braby Ltd. has supplied 23 standby power generators to the Thames Water Authority in England as static and mobile sets with power outputs ranging from 20-480 kVA. Automatic operation can be supplied to provide standby power to the pumps within 20 sec of power supply loss. The mobile sets which are being used in situations where power loss is not so critical can be towed to the emergency area and plugged into the main control panel. The static sets are rated to provide the high initial currents required for pump startup, with an alternator frame size chosen for the particular load of the station. Modifications to the existing distribution switchboard and to the busbar connections were made to prevent inadvertent parallelling of the standby generator sets to the main supply. (Schulz-FIRL)
W78-03531

MODEL TESTING AIDS SUCTION CHAMBER DESIGN,
Crown Zellerbach Corp., Seattle, WA.
I. W. Best, Jr.
Water and Wastes Engineering, Vol. 14, No. 9, p 86-87, 91-93, September, 1977. 10 fig.

Descriptors: *Hydraulic equipment, *Prototype tests, *Pumping, *Pump testing, Design criteria, Water conveyance, Operation and maintenance, Equipment, Pumps, Waste water treatment.

Model testing is suggested for the evaluation of alternate suction chamber designs for axial and mixed flow pumps. Problems encountered during the operation of the high specific speed pump for condenser circulating service, water filtration plants, and other systems requiring large quantities of water at relatively low heads have been related to inherent characteristics of the pump type. Since these can be influenced by suction chamber characteristics, proper design can also reduce operating costs and required floor space of the pumping system. Cavitation, air entrainment, overloading of the pump impeller, lowered capacity and efficiency, and bearing misalignment and vibration can all occur because of improper suction chamber design. The advantages of designing suction chambers with separate chambers for each pump are described. Adjustments in the bell-to-floor clearance and submergence are discussed with respect to pump performance. Techniques in model testing of hydraulic structures such as suction chambers are based on maintaining a geometric similarity and scale in the prototype so that problems can be anticipated and various modifications can be made in the design stage at relatively low cost, instead of after the full-scale model is in operation. (Schulz-FIRL)
W78-03584

UNDERWATER THERMAL ENERGY CONVERSION UNIT,
D. Spector.
U.S. Patent No. 4,041,707, 8 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 961, No 3, p 1016, August 16, 1977.

Descriptors: *Patents, *Energy conversion, *Energy transfer, Electric power production, Thermodynamics, Thermal properties, Temperature, Underwater, Heat exchangers.

An underwater thermal energy conversion unit is adapted to exploit the temperature differential between the surface temperature and the water temperature at the depth of submersion to generate useful power. The unit includes a cylinder divided by a piston assembly into a variable-temperature (VT) air-filled chamber and a constant-temperature (CT) air-filled chamber, both chambers being in heat exchange relationship with the relatively cold water at the depth of the submerged cylinder. The air in the CT chamber is always at the cold water temperature, whereas the air in the BT chamber communicates through a thermally-insulated duct with ambient air above the water body, so that when a control valve is open, the air temperature within the VT chamber rises above the cold water temperature, and when the valve is closed to isolate the VT chamber from ambient air, the air temperature falls again to the cold water temperature. A sensing system causes the valve to open when the temperatures in both chambers are at about the same level. As a consequence, the temperature in the VT chamber proceeds to rise to create an air pressure difference between the chambers, causing the piston assembly to move in the direction of the CT chamber to compress the air therein. When the temperature in the VT chamber reaches a level close to that of the ambient air, the sensing system then acts to close the valve, and the temperature in the VT chamber then proceeds to fall. As this occurs, the pressurized air in the CT chamber forces the piston assembly in the direction of the VT chamber to a point of equilibrium to complete the cycle. The reciprocation of the piston assembly is converted into output power. (Sinha - OEIS)
W78-03614

VALVES FOR THE WATER INDUSTRY.
Water Services, Vol. 81, No. 978, p 476-481, August, 1977.

Descriptors: *Construction materials, *Valves, *Elastomers, *Steel, *Iron alloys, Corrosion, Butterfly valves, Hydraulic valves, Equipment, Flow control, Conveyance structures, Waste water treatment.

Recent developments in valve design and construction for industrial, municipal, and water-related operations are described. The use of ductile iron in valves because of its resistance to mechanical and thermal shock and to corrosion is described. Ease of pouring, the ability to cast light sections of very high strength, and the high quality surface finish are cited as advantages of using ductile iron castings for valve components, gear box casings, combustion engine parts, and other products. The use of elastomers instead of natural rubber for valve components alleviates problems associated with absorption, swelling, aging, and attack by ozone, hydrocarbons, and acids. Applications of elastomers for butterfly valves and resilient sealing gate valves are discussed. Research into the use of stainless steel for valve components, to allow more compact designs and to resist corrosion by ionized waters, is discussed. (Schulz-FIRL)
W78-03624

8D. Soil Mechanics

DREDGING OPERATIONS IN THE GALVESTON DISTRICT,
Army Engineer District, Galveston, TX.
For primary bibliographic entry see Field 5G.
W78-03229

DREDGE MATERIAL CONTAINMENT IN NYLON BAGS IN THE CONSTRUCTION OF MINI-PROJECTS FOR BEACH STABILIZATION,
North Carolina State Univ. at Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W78-03230

THE NATIONAL DREDGING STUDY,
Office of the Chief of Engineers (Army), Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03231

HYDROLOGIC AND SEDIMENTOLOGIC STUDY OF THE OFFSHORE DREDGE DISPOSAL AREA, SAVANNAH, GEORGIA,
Skidaway Inst. of Oceanography, Savannah, GA.
For primary bibliographic entry see Field 5E.
W78-03233

ONE-DIMENSIONAL WAVE-PROPAGATION ANALYSIS, NEWBURGH LOCKS AND DAM, OHIO RIVER, INDIANA AND KENTUCKY,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavement Lab.
For primary bibliographic entry see Field 8B.
W78-03260

LANDSCAPE CONCEPT DEVELOPMENT FOR CONFINED DREDGED MATERIAL SITES,
Mann (Roy) Associates, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5E.
W78-03478

8F. Concrete

DESIGN OF ARCH DAMS, DESIGN MANUAL FOR CONCRETE ARCH DAMS.
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
For primary bibliographic entry see Field 8A.
W78-03491

CAST-IN-PLACE PIPE USES TRENCH AS FORM.
The American City and County, Vol 92, No 11, p 59-60, November, 1977.

Descriptors: *Concrete pipes, *Sewers, *Construction materials, *Concrete technology, *Pipes, Earth handling equipment, Formwork(Construction), Sewerage, Conveyance structures, Waste water treatment.

Cast-in-place concrete pipes have been recommended for fast construction at low cost in large diameter pipeline projects. The method is particularly suggested for situations where the soils are stable, no groundwater flows into the trench, a steady supply of ready-mix concrete is available, and where construction of several hundred feet of large diameter pipe is required. Current cast-in-place methods utilize both the sides and bottom of the pipe trench as the exterior form for the pipe to provide a strong bond between the pipe walls and trench. The Fullerform system, patented by Lomar Corporation of Santa, Ana, California, has been used in the construction of low-pressure piping for irrigation and storm sewer lines. The con-

tinuous, jointless structure eliminates problems associated with joint leaks and reduces the chance of clogging. Cast-in-place pipe projects have generally been bid below the engineering estimates for reinforced concrete or metal pipe. Installation crews as small as four people have been used and backfill can be completed after 72 hours curing time. Cylindrical steel forms are used for the exterior of the pipe and a variation of the slipforming technique which requires a heavy fabric inflatable tube is used for the interior walls. An anchor truck equipped with a compressor and generator is used to emplace and inflate the slipformer, while ready-mix concrete trucks feed concrete to the trench. Circular or square forms are used in pouring of the cast-in-place manholes. (Schulz-RIRL)
W78-03494

GLASS REINFORCED CONCRETE PIPES.
Water and Waste Treatment, Vol. 20, No. 8, p 26, August, 1977.

Descriptors: *Pipes, *Construction materials, *Sewerage, *Concrete pipes, *Conveyance structures, Corrosion, Sewage treatment, Waste water treatment.

'Slimline' glass reinforced concrete pipes are being produced commercially by ARC Concrete's factory at St. Ives, Cambridgeshire, in England. the pipes are reinforces with Pilkington's Cem-Fil glass fiber instead of the traditional steel and are useful in sewage treatment and surface water conveyance. The initial capacity of the factory was set at 10,000 tons/yr with allowances for later expansion via modular unit additions to increase the capacity to 50,000 tons/yr. The glass reinforced pipes are currently available in diameters of 600-1,200 mm. Current research at ARC Concrete is directed toward developing piping material which is resistant to attack by hydrogen sulfide or corrosive soils such as those which occur in the Middle East and other hot regions. (Schulz-FIRL)
W78-03497

CONCRETE STAVE TANKS.
Water and Waste Treatment, Vol 20, No 8, p 44, August, 1977.

Descriptors: *Concrete technology, *Construction materials, *Storage tanks, *Equipment, *Filters, Settling basins, Waste storage, Waste water treatment.

The 'Prestave' line of circular tanks, filter barrels and silos are manufactured by Tower Silos Ltd. for use in liquid storage, biological filters, and chemical storage. The units are constructed of hydraulically-formed high density concrete staves which are prestressed with external high strength steel hoops during erection. The 760-mm long by 320-mm wide staves are available in thicknesses of 64 and 76 mm. Filter barrel capacities range up to 4,000 cu m with diameters of 3.04-26 m. Silo capacities range up to 1,500 cu m with diameters of 3-30 m and heights up to 30 m. Storage tank capacities range up to 1,400 cu m with heights up to 9.15 m and diameters of 3.04-18.3 m. Specialized linings which are suitable to various applications are available. Auxiliary equipment can be supported on the top of the tank or along the walls of the tank itself, presenting an advantage in biological filtration with conventional stone or plastic media. (Schulz-FIRL)
W78-03552

REHABILITATION OF FILTER BED WALLS.
Water and Waste Treatment, Vol 20, No 8, p 18, August, 1977.

Descriptors: *Filters, *Construction materials, *Construction joints, *Concrete technology, *Equipment, Rehabilitation, Treatment facilities, Expansion, Sewage treatment, Waste water treatment.

The cracked and collapsing walls of the biological filter at Wessex Water Authority's Bruton sewage works in England were repaired in three days using a patented pre-cast concrete wall unit developed by Jan Brobowski and Partners in conjunction with ECC Quarries Limited. Temperature variations in the area had resulted in expansion of the wall, settling of the media, and cracking of the filter walls as construction was resisted by passive pressure. Post-tensioned cables had been initially wrapped around the walls, but they were not effective in preventing further expansion of the cracks. The number of additional cables required to alleviate the problem was prohibitive and backfilling to minimize temperature fluctuations would have been difficult. The last option under consideration was reconstruction of the filter. The ECC units which were finally installed did not require removal of the existing wall. Cooling contraction within the bolted joints of the ECC units prevents passive resistance failure via thin neoprene washers which absorb temperature movements and transmit ring forces. Steel dowels are grouted into the filter base slab to limit outward movement of the base of the filter wall. At Bruton the new wall was constructed as closely as possible to the existing wall. The remaining space between the two concentric walls was filled with pea-sized gravel to transmit expansion forces. (Schulz-FIRL)
W78-03556

8G. Materials

PRE-INSULATED PIPING SYSTEM USED FOR WATER AND TAILINGS AT CANADA'S FIRST ARCTIC MINE.
Water and Pollution Control, Vol. 115, No. 10, p 17, October, 1977. 3 fig.

Descriptors: *Mine wastes, *Plastic pipes, *Mine water, *Treatment facilities, *Construction materials, *Canada, Industrial wastes, Thermal insulation, Pipelines, Waste water treatment, Waste water disposal, Piping systems(Mechanical).

At Strathcona Sound, in northern Baffin Island, 450 mi north of the Arctic Circle, a lead-zinc mine and townsite are being developed by Nanisvik Ltd. Special insulated piping, designed for northern climates by Du Pont Ltd., of Canada was installed for water and mine tailings. This pre-insulated piping was selected because of its virtually trouble-free performance elsewhere in northern Canada, its cold weather durability, excellent resistance to abrasion, ease of handling, and speed of installation. The core of the system is Sclairpipe polyethylene pipe, which will not crack during fluid freeze-up. It is covered by factory-applied, polyurethane foam insulation. Galvanized steel protects the insulation from mechanical damage. Three pipelines were installed for the mine and town: a tailings line, water reclaim line, and water supply line. The 13,000 ft. tailings line is flanged for rotation and conveys tailings which are pumped uphill to the tailings pond. Another line carries reclaim water from the pond to the mill. (Snyder-FIRL)
W78-03214

NONPOINT SOURCE CONTROL GUIDANCE CONSTRUCTION ACTIVITIES,
Environmental Protection Agency, Washington, DC. Office of Water Planning and Standards.
For primary bibliographic entry see Field 5G.
W78-03268

EXPERIMENTAL BOILER PROMOTES DEVELOPMENT OF FUEL-SAVING WATER TREATMENT PROGRAMS.
For primary bibliographic entry see Field 5G.
W78-03294

A GUIDE TO SPECIFICATION OF GLASS LINED PIPE,
L. M. Williams.
Water and Sewage Works, Vol 124, No 10, p 76-77, October, 1977.

Descriptors: *Pipes, *Construction materials, *Linings, *Corrosion, *Sewers, *Design criteria, Operation and maintenance, Specifications, Materials engineering, Conveyance structures, Waste water treatment.

Since the use of glass-line pipe in sewage treatment plants has been increasing, a series of guidelines or specifications for glass linings is presented to aid the potential user in selecting a product which will provide years of service and trouble-free installation. Although there are no measurement references for lubricity or resistance to friction, the lining should have a vitreous appearance equivalent to that of opaque window glass. A hardness of 5.5 or higher on the MOHS hardness scale is required. In addition, the glass lining-to-metal bond should be able to withstand a strain of 0.001 in/in. The glass lining should also be free of pinholes, crazing, and fish scale and be able to withstand thermal shock of 350 F. Additional specifications which are related to the quality of casting and are not contained in any current specifications are recommended. Cast pipes with obvious flaws or roughness hould not be lined and cast iron is recommeded over ductile iron for glass lining. In terms of warpage, the finished glass lined pipe should not deviate more than 0.0i25' per foot of length from a centerline perpendicular to the flange face or square end of the pipe. (Schulz-FIRL)
W78-03492

PIPEWORK FLEXIBILITY,
R. Bryce.
Chartered Mechanical Engineer, p 47-50, December, 1977. 1 tab.

Descriptors: *Structural analysis, *Pipelines, Analytical techniques, *Sewers, *Strength of materials, Flexibility, Mechanical properties, Mathematical models, Conveyance structures.

A technique of structural analysis is presented for the examination of pipeline flexibility where deflections due to shear can be neglected. The pipe is aligned with respect to a system of right-hand coordinates and the displacements which occur when the pipe is subjected to external moments are examined. When the pipe is constrained to lie in a single plane, all deflections must lie in that plane and there is no torsional moment acting on the system. One end of the pipe is assumed fixed while the other is free to move under the action of external moments. Equations are presented for the displacement of the unfixed end due to the moment. Rotational parameters are incorporated into equations which describe the deflection of the complete pipe length. A three-plane system which allows for torsional effects is described. Components of displacement occurring at the unfixed end due to twisting and bending moments in the three-place system are defined for a three-section pipe. Angular rotations in the three-plane system are defined. (Schulz-FIRL)
W78-03495

GLASS REINFORCED CONCRETE PIPES.
For primary bibliographic entry see Field 8F.
W78-03497

TANK ACCESSORIES IN PLASTIC.
Water and Waste Treatment, Vol 20, No 9, p 66, September, 1977.

Descriptors: *Settling basins, *Plastics, *Construction materials, *Equipment, Corrosion, Sewage treatment, Design data, Industrial wastes, Municipal wastes, Waste water treatment.

Armshire-Sherville Plastics Ltd. of Biggleswade, England, has begun using glass reinforced polyester resin in equipment for water and sewage treatment, including settling tank weir plates and scum boards. The glass reinforced plastic poses advantages because of its corrosion resistance, strength, light weight, and stability over the temperature range -50 to 90C. Armshire-Sherville's special press molding process gives an easily-cleaned, algae-resistant, smooth finish to both sides of the polyester resin and also produces greater rigidity and flexural strength, which allow thinner wall sections and require less material. Air voids are also eliminated in the press molding process. Dimensions available in Armfibre weir plates and scum boards include thicknesses of 4 and 6 mm, a 2-m length, and depths of 200-500 mm. (Schulz-FIRL)
W78-03528

ELASTOMERIC MEMBRANES,
Dunlop Ltd., Skelmersdale (England). GRG Div.
E. R. Noble.
Water Services, Vol 81, No 978, p 481-483, August, 1977.

Descriptors: *Elastomers, *Linings, *Synthetic rubber, *Sealants, Equipment, Rubber, Construction materials, Storage tanks, Water treatment, Waste water treatment.

Applications of elastomeric membranes to water and waste treatment are described. Membranes have been used in effluent management to contain waste water for subsequent treatment or removal, as well as to line dumping sites or landfills for prevention of underground contamination by surface seepage. One use in India involved the lining of an irrigation canal. Natural rubber membranes have been used to reduce water loss from cracked concrete reservoirs. Common elastomeric membrane materials include Butyl, Epdm, chlorosulfonated polyethylene, and nitrile pvc. Butyl, the first synthetic rubber material offered commercially, is highly impermeable and offers a great deal of chemical resistance. Epdm (Ethylene propylene diene monomer) has a slightly higher resistance to high temperatures and ultraviolet radiation. Chlorosulfonated polyethylene (TM Hypalon) is coming into more widespread use because of its lower temperature tolerance and ease of fabrication. Nitrile pvc offers resistance to prolonged contact with hydrocarbon solvents. (Schulz-FIRL)
W78-03536

FIBRE MATS FOR LANDSCAPE ENGINEERING.
Waste and Waste Treatment, Vol 20, No 8, p 24, August, 1977.

Descriptors: *Construction materials, *Sewage lagoons, *Erosion control, *Infiltration, *Vegetation establishment, Runoff, Soil stabilization, Waste water treatment, Landscaping.

Enka Glanzstoff of Germany has developed a series nylon fiber mats for use in erosion control, riverbed linings, and sewage system canals, and for a variety of landscaping applications. The Enkamat technical mats consist of several layers of looped, nylon-6 threads in a bulky three-dimensional mat that can be filled with soil, sand or gravel. The mats exert a braking effect on surface water and winds and stabilize the loose or granular material which they contain. Water permeability is increased and root growth promoted to enhance the load-bearing capacity of the soil. Enkamat is available in 10- and 20-mm thicknesses in rolls of 1-m width and 100-150-m length. (Schulz-FIRL)
W78-03551

GLASS LINED TANKS GAIN POPULARITY.
Water and Waste Treatment, Vol 20, No 8, p 20, August, 1977.

Descriptors: *Construction materials, *Linings, *Equipment, *Basins, *Storage tanks, Industries, Waste water treatment, Water treatment.

Glass-lined tanks have come into use in the water and waste treatment industries and in a variety of industrial applications, including storage facilities for fertilizer, fuel oils, fruit pulp, salt solutions, adhesives, sludge, and chemicals. Tristorage Ltd. of Maidstone, Kent, England, produces a wide range of tanks constructed from pre-drilled and radiused sheets to allow easy transport and construction. A strong glass-to-steel bond and a smooth glass surface are created by a process which involves firing at 845C. The tanks are resistant to corrosion, designed for storing liquids of a wide pH range, and are available in sizes of 800-373,000 gal. They can set on steel supports, installed at ground level, or submerged. The prefabricated sheets are manufactured in 4 ft 6 inch standard heights which are then bolted together. Flat sheet roofs, cast aluminum roof hatches, steel ladders, platforms, cages, and handrails are also available as tank accessories from Tristorage. All seams are sealed with a bituminous or polyurethane compound. (Schulz-FIRL)
W78-03555

LEAK TESTING WITH DYED LIQUID TRACERS,
Shannon-Glow Inc., Los Angeles, CA.
For primary bibliographic entry see Field 5B.
W78-03580

VALVES FOR THE WATER INDUSTRY.
For primary bibliographic entry see Field 8C.
W78-03624

8I. Fisheries Engineering

ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE. VOL II - ROCKY MOUNTAIN REGION CASE STUDIES,
Enviro Control, Inc., Rockville, MD.
For primary bibliographic entry see Field 5C.
W78-03459

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982, (FINAL DRAFT).
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
For primary bibliographic entry see Field 6B.
W78-03428

9C. Research Facilities

ENVIRONMENTAL RESEARCH OUTLOOK (FY 1977 THROUGH FY 1981).
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W78-03695

9D. Grants, Contracts, and Research Act Allotments

DIRECTIONS IN U. S. WATER RESEARCH: 1978-1982, (FINAL DRAFT).
Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Water Resources Research.
For primary bibliographic entry see Field 6B.
W78-03428

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

ANAEROBIC PROCESSES, (LITERATURE REVIEW),
Institute of Gas Technology, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-03218

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II - FINAL REPORT (APPENDIX, LISTING OF REFERENCES),
Stanford Research Inst. Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-03456

WATER RECLAMATION AND REUSE, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, OH.
For primary bibliographic entry see Field 5D.
W78-03537

MARSH MANAGEMENT FOR WILDLIFE: A BIBLIOGRAPHY WITH ABSTRACTS,
Louisiana Cooperative Wildlife Research Unit, Baton Rouge.
For primary bibliographic entry see Field 2L.
W78-03656

A SELECTED ANNOTATED BIBLIOGRAPHY OF ECONOMIC VALUES OF FISH AND WILDLIFE AND THEIR HABITATS,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W78-03660

BASELINE STUDY PROGRAM, NORTH PUGET SOUND BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL. II BIBLIOGRAPHY,
Beak Consultants Inc., Portland, OR.
For primary bibliographic entry see Field 05B.
W78-03698

10F. Preparation Of Reviews

WATER RECLAMATION AND REUSE, (LITERATURE REVIEW),
Environmental Protection Agency, Cincinnati, OH.
For primary bibliographic entry see Field 05D.
W78-03537

2
Extensi
Action
W78-03

2,4-D in
W78-03

ABSORPT
A Hydr
by Sele
W78-03

ACCESS
Lane V
Prohibi
to Tide
W78-03

ACHROM
Extensi
Action
W78-03

ACIDIC
Acid M
Stream
W78-03

ACIDS
Recove
Dyestu
W78-03

ACTIVA
The St
Wastew
W78-03

Compa
Carbon
W78-03

Upflow
W78-03

Advan
Colesh
W78-03

Purific
Activa
Biolog
von kc
nach s
und Fi
W78-0

The P
Means
Biolog
von kc
nach s
und Fi
W78-0

Remo
cal an
W78-0

Perfor
Aquec
Granu
W78-0

ACTIVA
Organ
water
W78-0

SUBJECT INDEX

2

Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

2,4-D in Slow-Moving Water,
W78-03442 5B

ABSORPTION

A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

ACCESS ROUTES

Lane V. City of Redondo Beach (Municipality Prohibited from Interfering with Public Access to Tidelands or Navigable Waters).
W78-03383 6E

ACHROMOBACTER

Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

ACIDIC WATER

Acid Mine Drainage Treats Sewage Dumped in Streams.
W78-03212 5G

ACIDS

Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

ACTIVATED CARBON

The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

Upflow-Downflow Carbon Adsorption,
W78-03533 5D

Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

ACTIVATED SLUDGE

Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

Removing Phosphates from Effluent by the Activated Sludge Process--With Countercurrent Extn. of the Phosphate Contg. Sludge.
W78-03499 5D

Aeration Tank for Activated Sludge Treatment of Waste Water--Is Smaller and Requires Less Power for a Given Treatment Capacity.
W78-03500 5D

Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

Lisnaskea Sewage-Treatment Works,
W78-03542 5D

Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

Periodic Operation of an Activated Sludge Process,
W78-03582 5D

Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

ADHESIVES

Starch Recovery Exceeds 90% with Liquid Cyclone System.
W78-03202 5D

ADMINISTRATIVE AGENCIES

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

Water Quality Act.
W78-03412 6E

American Iron and Steel Institute v Environmental Protection Agency (Jurisdiction for Judicial Review of Environmental Protection Agency Regulations).
W78-03416 6E

ADSORPTION

Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

Upflow-Downflow Carbon Adsorption,
W78-03533 5D

Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

ADVECTION

Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

AERATION

Laboratory Study of Aeration as a Feasible Technique for Dewatering Fine-Grained Dredged Material.
W78-03480 5E

Removing Phosphates from Effluent by the Activated Sludge Process--With Countercurrent Extn. of the Phosphate Contg. Sludge.
W78-03499 5D

Aeration Tank for Activated Sludge Treatment of Waste Water--Is Smaller and Requires Less Power for a Given Treatment Capacity.
W78-03500 5D

Vertical Axis Aerating Rotor for Waste Water--Can be Operated at Higher Speeds than Previous Inverted Cone Turbine Rotors.
W78-03502 5D

Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

AERIAL PHOTOGRAPHY

Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

AEROBIC TREATMENT
Treatment Facilities Expanded at Denver Sewage District.
W78-03505 5D

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

AFRICA
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

AGRICULTURAL WATERSHEDS
Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

AIR POLLUTION
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

Pollution and Industrial Waste.
W78-03325 5G

AIR-WATER INTERFACES
Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

ALASKA
Alaska Pipeline--Financial Responsibility for Oil Spills.
W78-03340 5G

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

ALFALFA
The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

ALGAE
Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

ALGAL CONTROL
Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

ALIPHATIC AMINES
Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

ALLIGATORWEED
Field Trip, Goose Creek Reservoir,
W78-03433 4A

ALLIGATORWEED FLEA BEETLE
Field Trip, Goose Creek Reservoir,
W78-03433 4A

ALPOWA CREEK (WASH)
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

ALTERNATIVE PLANNING
Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

AMINE CARBAMATES
Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

AMMONIUM COMPOUNDS
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

ANAEROBIC CONDITIONS
Anaerobic Processes, (Literature Review),
W78-03218 5D

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

ANAEROBIC DIGESTION
Anaerobic Processes, (Literature Review),
W78-03218 5D

The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

ANALYTICAL TECHNIQUES
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

Chemical Analyses for Water Pollutants: Training Manual.
W78-03261 5A

Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

Trace Analysis of Arsenic by Colorimetry, Atomic Absorption and Polarography,
W78-03665 5A

The Foundations of Organic Pollutant Analysis,
W78-03671 5A

ANNELIDS
Earthworms to Aid Sludge Disposal.
W78-03221 5E

ANTITRANSPIRANTS
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

APPALACHIAN MOUNTAIN REGION
Development of Water Resources in Appalachia.
W78-03675 6B

APPROPRIATION
Water Saved or Water Lost: The Consequences of Individual Conservation Measures in the Appropriation States,
W78-03379 3B

City of Grand Junction v. Kannah Creek Association (The Scope of Permissible Water Use Acquired by a Condemnation Judgment).
W78-03397 6E

Twin Lake Reservoir and Canal Company v. City of Aspen (Intent and Physical Act Required for Appropriation).
W78-03401 6E

AQUATIC ENVIRONMENT
Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

AQUATIC FUNGI
Sewage Fungus Growth in Rivers Receiving Paper Mill Effluent,
W78-03323 5C

AQUATIC LIFE
Barataria Basin: Biological Characterization,
W78-03289 5C

AQUATIC PLANT CONTROL PROGRAM
Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

History of the Aquatic Plant Control Program,
W78-03430 5G

AQUATIC PLANTS
Method for Controlling the Growth of Aquatic Plants,
W78-03616 4A

AQUATIC WEED CONTROL
Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

History of the Aquatic Plant Control Program,
W78-03430 5G

Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

Field Trip, Goose Creek Reservoir,
W78-03433 4A

Aquatic Plant Problems in Puerto Rico,
W78-03434 4A

Reconnaissance Survey of Aquatic Weed Infestations in Lakes and Navigable Streams in Oklahoma,
W78-03435 5G

Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

2,4-D in Slow-Moving Water,
W78-03442 5B

Method for Controlling the Growth of Aquatic Plants,
W78-03616 4A

AQUICULTURE
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

AQUIFER MANAGEMENT
The Rising Cost of Making Deserts Bloom,
W78-03621 4B

AQUIFERS
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

ARCH DAMS
Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

AREA REDEVELOPMENT
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

ARIZONA
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

ARKANSAS
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

ARTESIAN WELLS
Artesian Wells.
W78-03415 6E

ASBESTOS
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

ASSESSMENT
Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

ASSESSMENTS
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

ATLANTIC OCEAN
Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

AUTOMATIC CONTROL
Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

AUTOMATION
Ultrasonic Sludge Dip Stick.
W78-03561 5A

How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

BACTERIA
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

BAGES-SIGEAN LAGOON (FRANCE)
The Lagoon of Bages-Sigean, A Model of a Mediterranean Lagoon, (In French),
W78-03668 2H

BALTIC SEA
Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

BANKS
Importance, Preservation and Management of Riparian Habitat: A Symposium, Tucson, Arizona, July 9, 1977.
W78-03661 4C

BARATARIA BASIN (LA)
Barataria Basin: Biological Characterization,
W78-03289 5C

BASELINE STUDIES
A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

Geographic Areas of Particular Concern.
W78-03273 2L

Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

Barataria Basin: Biological Characterization,
W78-03289 5C

Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

BASINS
Glass Lined Tanks Gain Popularity.
W78-03555 8G

BATHYMETRY
Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

BAYS
The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

BDELLOVIBRIO BACTERIOVORUS
Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

BEACH EROSION
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

Shore and Beach Management in Louisiana,
W78-03341 2L

Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

BEACHES
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

Northern St. Johns County Coastal Management Plan,
W78-03349 6F

The Fight to Save Hawaii's Shorelines,
W78-03354 2L

Lane V. City of Redondo Beach (Municipality Prohibited from Interfering with Public Access to Tidelands or Navigable Waters).
W78-03383 6E

BENEFICIAL USE
Appropriation of Water for Beneficial Use.
W78-03410 6E

Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

BENEFITS
Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

BENTHOS
Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

BERING SEA
Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

BIBLIOGRAPHIES
Anaerobic Processes, (Literature Review),
W78-03218 5D

Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

BIOASSAY
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

BIOCHEMICAL OXYGEN DEMAND
Starch Recovery Exceeds 90% with Liquid Cyclone System.
W78-03202 5D

Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

BIOCONTROL
Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

Field Trip, Goose Creek Reservoir,
W78-03433 4A

Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

BIODEGRADATION
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

Difficulty Decomposed Toxic Substances from the Pulp and Paper Industry (Svarnedbrytbara, toxiska amnen fran pappers- och cellulosaindustrin),
W78-03306 5C

Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

BIOINDICATORS
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

BIOLOGICAL TREATMENT
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

Earthworms to Aid Sludge Disposal.
W78-03221 5E

Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

BIOMASS
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

Diurnal Zooplankton Migration in Ponds of the Turkmen SSR, (In Russian),
W78-03453 2H

Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

BIRCH FORESTS
The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

BLEACHING WASTES
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

Toxicities of Bleaching Effluents Under Finnish Conditions (Toxiciteten hos blekeriavloppsvatten i finska forhallanden),
W78-03305 5C

Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

Bleach Plant Filtrate Recovery,
W78-03322 5D

BOARD MILLS
New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

BOGS
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

BOILER FEED WATER
Experimental Boiler Promotes Development of Fuel-Saving Water Treatment Programs.
W78-03294 5G

BORON
The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

BOTTOM BRINE
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

BOUNDARIES (PROPERTY)
Bourgeois v. United States (Title to Islands in Non-Navigable Bodies of Water).
W78-03400 6E

BREAKERS
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

BRISHIE BOG (SCOTLAND)
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

BRITISH COLUMBIA
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

BROOD STOCK
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

BUDGETING
Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

CADMIUM
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

CALCIUM HYDROXIDE
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

CALIFORNIA
Retention of Soil Water Following Forest Cutting,
W78-03252 2G

Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

State Board Adopts Comprehensive Action Plan (Wastewater Reclamation),
W78-03363 5G

The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

Carlotto Limited V. County of Ventura (Apportionment of Flood Damage Caused by Negligence).
W78-03382 6E

Lane V. City of Redondo Beach (Municipality Prohibited from Interfering with Public Access to Tidelands or Navigable Waters).
W78-03383 6E

REA Enterprises V. California Coastal Zone Commission (California Coastal Zone Commission Review of Regional Permits).
W78-03384 6E

No Oil, Incorporated V. Occidental Petroleum Corporation (Exemptions from Permit Requirements Under the California Coastal Zone Conservation Act).
W78-03385 6E

Buchanan V. City of Newport Beach (Municipal Responsibility for Surfing Injuries Indirectly Related to Construction of Jetty).
W78-03386 6E

Buchanan V. Los Angeles County Flood Control District (Responsibility of Flood District for Controlling Water Flow).
W78-03391 6E

Swanson V. Marin Municipal Water District (Water Districts Empowered to Regulate Water Use in Emergencies).
W78-03392 6E

Carmel Valley View, Limited v. Board of Supervisors, in and for County of Monterey (Denial of Use of Septic Tanks in Proposed Subdivision).
W78-03393 6E

Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

Tri-Chem, Incorporated v Los Angeles County Flood Control District, County of Los Angeles (Duties of Municipalities to Provide Water Runoff Protection for Private Landowners).
W78-03395 6E

CALIFORNIA UNDERCURRENT
On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

CANADA
Waste Treatment Process now Available in Canada.
W78-03203 5D

Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

CANADA (BRITISH COLUMBIA)
Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

CAPE FEAR RIVER (NC)
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

CARBOHYDRATES
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

CARBON
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

CARP
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

CELLULOSE
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

CENTRIFUGATION
Concentrating Wool Contaminants.
W78-03208 5D

Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

CERCOSPORA RODMANII
Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

CESSPOOLS
Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

CHAETOGNATHA
Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

CHANNEL FLOW
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

CHANNELS
Channel Modification Guidelines.
W78-03350 4A

Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

CHARA-SP
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

CHARTS
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

CHEMCONTROL
Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

CHEMICAL ANALYSIS
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Chemical Analyses for Water Pollutants: Training Manual.
W78-03261 5A

Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

CHEMICAL INDUSTRY
Hooker Chemicals and Plastics Corporation v. Train (Review of Environmental Protection Agency's New Source Regulations for Phosphate Manufacturing Industry).
W78-03413 6E

Hooker Chemicals and Plastics Corporation v. Train (Federal Court Review of Environmental Protection Agency Guidelines).
W78-03414 6E

CHEMICAL OXYGEN DEMAND
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

CHEMICAL PRECIPITATION
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

CHEMICAL PROPERTIES
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

CHEMICAL REACTIONS
Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

CHEMICAL STRATIFICATION
The Meromictic Great Salt Lake,
W78-03446 2H

CHEMICAL WASTES
The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

DuPont de Nemours Company V. Train (Effluent Limitations Based upon Industry-Wide Regulations Permissible Under Section 301).
W78-03381 6E

Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

CHEMICALS
Experimental Boiler Promotes Development of Fuel-Saving Water Treatment Programs.
W78-03294 5G

Identification of Selected Federal Activities Directed to Chemicals of Near-Term Concern (Benzene, Bis(Chloromethyl) Ether, Cadmium, Hydrogen Sulfide, Mercury, Platinum, Polynuclear Aromatic Hydrocarbons, Trichloroethylene, Tris (2,3-Dibromopropyl), Phosphate).
W78-03666 5A

Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

CHESAPEAKE BAY
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

CHLORINATION
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

CHLORINE
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

CHROMIUM
Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

CHRONICITY
Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

CIRCULATION
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

CITRUS-UNSHIU
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

CLARIFICATION
Water Clarification by Flotation,
W78-03223 5D

Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

CLASSIFICATION
Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

CLAYS
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

CLEAR-CUTTING
Retention of Soil Water Following Forest Cutting,
W78-03252 2G

Alteration of Environmental Conditions in Cleared Narrow Strips in Spruce Forests of the Tien-Shan, (In Russian),
W78-03301 4C

CLIMATES
Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

CLOUD PHYSICS
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

COAGULATION
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

COAL COMBUSTION
A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

COAL CONVERSION PROCESSES
Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

COAL MINE WASTES
Automatic Water-Treatment Plant.
W78-03213 5D

Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

COALS
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

COAST GUARD
Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

COASTAL ENGINEERING
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

COASTAL MARSHES
Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

COASTAL STRUCTURES
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

COASTAL-TRAPPED WAVES
Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

COASTAL WETLANDS
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

COASTS
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

Geographic Areas of Particular Concern.
W78-03273 2L

Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

North Carolina Coastal Zone Management Act,
W78-03342 2L

REA Enterprises V. California Coastal Zone Commission (California Coastal Zone Commission Review of Regional Permits).
W78-03384 6E

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

COHESIONLESS SOILS
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

COLIFORMS
Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

COLOR
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

COLORADO
City of Grand Junction v. Kannah Creek Association (Right to Change Beneficial Use of Appropriated Waters).
W78-03396 6E

City of Grand Junction v. Kannah Creek Association (The Scope of Permissible Water Use Acquired by a Condemnation Judgment).
W78-03397 6E

City of Boulder v. Boulder and Left Hand Ditch Company (Rights of Junior Appropriators to Return Flow).
W78-03398 6E

Twin Lake Reservoir and Canal Company v. City of Aspen (Intent and Physical Act Required for Appropriation).
W78-03401 6E

Arkansas River Compact.
W78-03407 6E

COMMERCIAL SHELLFISH
Marl, Sand, Gravel, Shell and Mudshell.
W78-03403 6E

COMMUNITY DEVELOPMENT
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

COMPACTION
Dewatering Clay Slurries,
W78-03593 5D

COMPENSATION
Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

Oil Pollution Liability Legislation Transmitted to the Congress,
W78-03343 5G

COMPENSATION

The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

COMPREHENSIVE PLANNING

Water Resource Planning and Rural Water Systems,
W78-03371 6E

Environmental Research Outlook (FY 1977 Through FY 1981).
W78-03695 5G

COMPUTER MODELS

The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

COMPUTER PROGRAMS

Water Table Mapping User's Manual,
W78-03484 7C

Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

CONCRETE DAMS

Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

CONCRETE PIPES

Cast-in-Place Pipe Uses Trench as Form.
W78-03494 8F

Glass Reinforced Concrete Pipes.
W78-03497 8F

CONCRETE TECHNOLOGY

Cast-in-Place Pipe Uses Trench as Form.
W78-03494 8F

Concrete Stave Tanks.
W78-03552 8F

Rehabilitation of Filter Bed Walls.
W78-03556 8F

CONDEMNATION

Gleghorn V. City of Wichita Falls (Improper Jury Instructions in Condemnation Suit).
W78-03387 6E

City of Grand Junction v. Kannah Creek Association (The Scope of Permissible Water Use Acquired by a Condemnation Judgment).
W78-03397 6E

CONDEMNATION VALUE

Gleghorn V. City of Wichita Falls (Improper Jury Instructions in Condemnation Suit).
W78-03387 6E

CONFLICTS

Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

CONSERVATION

State Water Plan Storage Act (Kansas).
W78-03405 6E

CONSTRUCTION

Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

EPA Enlists Army to Manage Sewage Plant Construction.
W78-03625 5G

CONSTRUCTION JOINTS

Rehabilitation of Filter Bed Walls.
W78-03556 8F

CONSTRUCTION MATERIALS

Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

Cast-in-Place Pipe Uses Trench as Form.
W78-03494 8F

The Twin-Tunnel Concept.
W78-03496 8A

Glass Reinforced Concrete Pipes.
W78-03497 8F

Developments in the Treatment of Effluent,
W78-03506 5D

Tank Accessories in Plastic.
W78-03528 8G

Fibre Mats for Landscape Engineering.
W78-03551 8G

Concrete Stave Tanks.
W78-03552 8F

Glass Lined Tanks Gain Popularity.
W78-03555 8G

Rehabilitation of Filter Bed Walls.
W78-03556 8F

Valves for the Water Industry.
W78-03624 8C

CONTINENTAL SHELF

A Legal Order for the Oceans, II,
W78-03691 6E

CONTRACT ADMINISTRATION

EPA Enlists Army to Manage Sewage Plant Construction.
W78-03625 5G

CONVEYANCE STRUCTURES

The Twin-Tunnel Concept.
W78-03496 8A

Glass Reinforced Concrete Pipes.
W78-03497 8F

Sea Outfall for Dorset.
W78-03557 5E

COOLING PONDS

Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

COOLING WATER

Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

COORDINATION

The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

COPEPOD

Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

COPPER SULFATE MONOHYDRATE

Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

CORROSION

A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

COST ANALYSIS

Ownership and Water System Operation,
W78-03647 6C

Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

COST-BENEFIT ANALYSIS

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

COST SHARING

Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

COSTS

Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

Water Conservation in Textile Finishing,
W78-03211 5D

Industrial Effluent Control and Charges,
W78-03217 5G

Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

Energy Guzzling Sewage Plant Will Fuel Itself.
W78-03522 5D

Welsh Water Re-organization.
W78-03623 5G

CRUSTACEANS

Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

CULTURES

Oxygen Diffusion and Fermentations,
W78-03216 5D

CULVERTS

Mississippi State Highway Commission v. Tyner (Owners of Land Bordering Natural Watercourses May Increase and Accelerate Surface Water Drainage without Liability).
W78-03376 6E

CURRENTS (WATER)

On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

CYANOPHYTA

Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

CYCLING NUTRIENTS
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

CYPRESS SWAMP
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

DAIRY INDUSTRY
Lisnaskea Sewage-Treatment Works,
W78-03542 5D

Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

DAM CONSTRUCTION
Upper Missouri Region, Fiscal Year 1974.
W78-03360 6E

DAM DESIGN
Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

DAM FAILURE
Carlotto Limited V. County of Ventura (Apportionment of Flood Damage Caused by Negligence).
W78-03382 6E

DAM FOUNDATIONS
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

DAMAGES
The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

Gleghorn V. City of Wichita Falls (Improper Jury Instructions in Condemnation Suit).
W78-03387 6E

DAMS
Lange v. Town of Norway (Municipal Liability for Negligent Flooding).
W78-03375 6E

Buchanan V. Los Angeles County Flood Control District (Responsibility of Flood District for Controlling Water Flow).
W78-03391 6E

Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

DATA COLLECTIONS
The National Dredging Study,
W78-03231 5G

User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

Grand Traverse Bay Limnological Data,
W78-03488 2H

Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

Registry of Toxic Effects of Chemical Substances, 1976 Edition.
W78-03679 5A

DATA PROCESSING
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

DATA REQUIREMENTS
Reservoir Planning and Operation,
W78-03630 4A

DECISION MAKING
Reservoir Planning and Operation,
W78-03630 4A

DELAWARE
Geographic Areas of Particular Concern.
W78-03273 2L

Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

DELAWARE BAY
Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

DELAWARE RIVER
A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

DENITRIFICATION
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

Biological Denitrification of Water,
W78-03604 5D

DEPOSITION (SEDIMENTS)
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

DESALINATION
Reverse Osmosis Membrane,
W78-03606 3A

Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

DESALINIZATION
Death of the Sweet Waters,
W78-03326 5G

DESIGN
Urban Stormwater Management,
W78-03632 5G

DESIGN CRITERIA
A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

Periodic Operation of an Activated Sludge Process,
W78-03582 5D

Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

DESIGN DATA
Sewage Channel Bar Screen Rake--Raisable by Chain Along Rearward Swivelling Carrier on Cantilever with Power Cylinder Drive.
W78-03498 5D

Developments in the Treatment of Effluent,
W78-03506 5D

Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

DESTRATIFICATION
Method for Destratifying Bodies of Water,
W78-03605 5G

DEUTERIUM
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

DEVELOPED WATERS
Water Saved or Water Lost: The Consequences of Individual Conservation Measures in the Appropriation States,
W78-03379 3B

DEWATERING
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

DEWATERING

Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

Laboratory Study of Aeration as a Feasible Technique for Dewatering Fine-Grained Dredged Material.
W78-03480 5E

Sludge Dewatering--A Task the right Equipment Makes Easier.
W78-03510 5D

Sewage Sludge and How to Sell It,
W78-03511 5E

Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

Dewatering Clay Slurries,
W78-03593 5D

DIATOMS

Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

DIFFUSION

Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

DIFFUSIVITY

A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

DISCHARGE (WATER)

Porter County Chapter of Izaak Walton League of America, Incorporated v. Train (Procedural Rules for Intervenors in Environmental Protection Agency Administrative Hearings).
W78-03377 6E

Save the Bay, Incorporated v. Mississippi Air and Water Pollution Control Commission (Hearing Requirements for Discharge Permits Under NPDES).
W78-03378 6E

Appalachian Power Company V. Train (Review of EPA Regulations Governing Discharge of Heat).
W78-03380 6E

Pleasant View Utility District V. Vradenburg (Recovery for Taking of Flowage Easement Barred by Statute of Limitations).
W78-03389 6E

Buchanan V. Los Angeles County Flood Control District (Responsibility of Flood District for Controlling Water Flow).
W78-03391 6E

DISINFECTION

Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Irradiating Dried Sludge Could Benefit Environment, Save Energy.
W78-03526 5D

Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

DISPERSION

A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

DISPOSAL

Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

Final Revision of Regulations and Criteria for Ocean Dumping.
W78-03369 5G

DISSOLVED OXYGEN

Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

DISSOLVED OXYGEN ANALYZERS

The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

DISSOLVED SOLIDS

Dissolved Solids in Wastewater,
W78-03567 5B

DISTRIBUTION

Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

DITCHES

Tri-Chem, Incorporated v Los Angeles County Flood Control District, County of Los Angeles (Duties of Municipalities to Provide Water Runoff Protection for Private Landowners).
W78-03395 6E

DIVERSION

City of Boulder v. Boulder and Left Hand Ditch Company (Rights of Junior Appropriators to Return Flow).
W78-03398 6E

DOMBAS (NORWAY)

Fauna and Densities of Molluscs in Some Mountain Waters in the Surroundings of Dombas (South Norway), (In German),
W78-03669 5B

DOMESTIC WASTES

Sanitation for the Developing Nations.
W78-03530 5D

Greywater for the Greenhouse,
W78-03534 5D

DOWNWELLING (LAKES)

Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

DRAINAGE

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

DRAINAGE ORDINANCES

The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

DRAINAGE PROGRAMS

The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

DRAINAGE SYSTEMS

Buchanan V. Los Angeles County Flood Control District (Responsibility of Flood District for Controlling Water Flow).
W78-03391 6E

DRAINAGE WATER

Pleasant View Utility District V. Vradenburg (Recovery for Taking of Flowage Easement Barred by Statute of Limitations).
W78-03389 6E

Tri-Chem, Incorporated v Los Angeles County Flood Control District, County of Los Angeles (Duties of Municipalities to Provide Water Runoff Protection for Private Landowners).
W78-03395 6E

DREDGED MATERIAL

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

DREDGED MATERIAL DISPOSAL

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

DREDGED MATERIAL RESEARCH PROGRAM
Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

DREDGING
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

A New Concept for Dredged Material Disposal,
W78-03228 5E

Dredging Operations in the Galveston District,
W78-03229 5G

The National Dredging Study,
W78-03231 5G

Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

Marl, Sand, Gravel, Shell and Mudshell.
W78-03403 6E

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

Laboratory Study of Aeration as a Feasible Technique for Dewatering Fine-Grained Dredged Material.
W78-03480 5E

First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

DRILLING
No Oil, Incorporated V. Occidental Petroleum Corporation (Exemptions from Permit Requirements Under the California Coastal Zone Conservation Act).
W78-03385 6E

DRYING
Sludge Dewatering--A Task the right Equipment Makes Easier.
W78-03510 5D

Sewage Sludge and How to Sell It,
W78-03511 5E

DUNDALK PLATEAU (ONTARIO)
Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

DUNES
Northern St. Johns County Coastal Management Plan,
W78-03349 6F

DYES
Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

E. COLI
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

EASEMENTS
Pleasant View Utility District V. Vradenburg (Recovery for Taking of Flowage Easement Barred by Statute of Limitations).
W78-03389 6E

ECOLOGY
Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

ECONOMIC EFFICIENCY
Stochastic Models for Reservoir Design,
W78-03631 4A

ECONOMIC FEASIBILITY
Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

ECONOMICS
Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

EPA Enlists Army to Manage Sewage Plant Construction.
W78-03625 5G

A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

ECOSYSTEMS
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Barataria Basin: Biological Characterization,
W78-03289 5C

EFFLUENTS
Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

Water Conservation in Textile Finishing,
W78-03211 5D

Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

Effluent Limitations Guidelines for Existing Sources and Standards of Performance for New Sources.
W78-03331 5G

Petroleum Refining Point Source Category Pretreatment Standards for Existing Sources Effluent Guidelines and Standards.
W78-03346 5G

Judicial Maelstrom in Federal Waters: A Composite Interpretation of the Federal Water Pollution Control Act Amendments of 1972,
W78-03356 5G

DuPont de Nemours Company V. Train (Effluent Limitations Based upon Industry-Wide Regulations Permissible Under Section 301).
W78-03381 6E

Hooker Chemicals and Plastics Corporation v. Train (Review of Environmental Protection Agency's New Source Regulations for Phosphate Manufacturing Industry).
W78-03413 6E

American Iron and Steel Institute v Environmental Protection Agency (Jurisdiction for Judicial Review of Environmental Protection Agency Regulations).
W78-03416 6E

Water Monitor System: Phase I Test Report,
W78-03663 5A

ELASTOMERS
Elastomeric Membranes,
W78-03536 8G

Valves for the Water Industry.
W78-03624 8C

ELECTRIC CURRENTS
Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

ELECTRIC POWER PRODUCTION
Turbine Standby for Water and Sewage Plants.
W78-03520 8C

ELECTRIC POWERPLANTS
Appalachian Power Company V. Train (Review of EPA Regulations Governing Discharge of Heat).
W78-03380 6E

ELECTRICAL CONDUCTANCE
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

ELECTRICITY
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

ELECTROLYSIS
Apparatus for the Electrolysis of Water Which Operates Under Pressure,
W78-03602 5F

EMINENT DOMAIN
Bourgeois v. United States (Title to Islands in Non-Navigable Bodies of Water).
W78-03400 6E

EMISSIONS
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

ENERGY
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

Energy Guzzling Sewage Plant Will Fuel Itself.
W78-03522 5D

Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

ENERGY BALANCE METHOD (PLANTS)
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

ENERGY BUDGET
Thermal Regime of Prairie Snowcover,
W78-03460 2C

ENERGY CONVERSION
Underwater Thermal Energy Conversion Unit,
W78-03614 8C

ENERGY TRANSFER
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

Underwater Thermal Energy Conversion Unit,
W78-03614 8C

ENVIRONMENT
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

ENVIRONMENTAL CONTROL
First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

ENVIRONMENTAL EFFECTS
'Innovative' Assessment Technology Allows More Accurate Prediction.
W78-03209 5C

Acid Mine Drainage Treats Sewage Dumped in Streams.
W78-03212 5G

Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

Marine Pollution: A Multi-Faceted, Multi-Agency Detection, Research and Enforcement Program.
W78-03628 5G

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

Identification of Selected Federal Activities Directed to Chemicals of Near-Term Concern (Benzene, Bis(Chloromethyl) Ether, Cadmium, Hydrogen Sulfide, Mercury, Platinum, Polynuclear Aromatic Hydrocarbons, Trichloroethylene, Tris (2,3-Dibromopropyl), Phosphate).
W78-03666 5A

Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

ENVIRONMENTAL IMPACT
Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

ENZYMES
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

EQUALIZING RESERVOIRS
Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

EQUIPMENT
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

Sewage Channel Bar Screen Rake--Raisable by Chain Along Rearward Swivelling Carrier on Cantilever with Power Cylinder Drive.
W78-03498 5D

Aeration Tank for Activated Sludge Treatment of Waste Water--Is Smaller and Requires Less Power for a Given Treatment Capacity.
W78-03500 5D

Elimination of Nitrogen CPDS. From Waste Water--By Downwards Passage Through Biological Treatment Units in a Suitable Atmos.
W78-03501 5D

Vertical Axis Aerating Rotor for Waste Water--Can be Operated at Higher Speeds than Previous Inverted Cone Turbine Rotors.
W78-03502 5D

Highly Advanced Sewage Treatment (Hochentwickelte Abwasserreinigung).
W78-03514 5D

Turbine Standby for Water and Sewage Plants.
W78-03520 8C

Tank Accessories in Plastic.
W78-03528 8G

Recessed Impeller Pump.
W78-03529 8C

Increase in Standby Generation.
W78-03531 8C

Concrete Stave Tanks.
W78-03552 8F

Complete Service for Slurry Recycling.
W78-03553 5E

Glass Lined Tanks Gain Popularity.
W78-03555 8G

Rehabilitation of Filter Bed Walls.
W78-03556 8F

Ultrasonic Sludge Dip Stick.
W78-03561 5A

How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

EQUITY
Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

ERODIBILITY (SUBSOILS)
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

EROSION
Research Needs in Erosion and Sedimentation.
W78-03248 2J

Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

EROSION CONTROL
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

Fibre Mats for Landscape Engineering.
W78-03551 8G

ESTIMATING
Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

ESTUARIES
Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

ESTUARINE ENERGETICS
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

ESTUARINE ENVIRONMENT
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

EUCALYPTUS TREES
Retention of Soil Water Following Forest Cutting,
W78-03252 2G

EURASIAN WATER MILFOIL
Reconnaissance Survey of Aquatic Weed Infestations in Lakes and Navigable Streams in Oklahoma,
W78-03435 5G

EUTROPHICATION
Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

EVALUATION
'Innovative' Assessment Technology Allows More Accurate Prediction.
W78-03209 5C

Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

EVAPORATION
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

EVAPORATIVE COOLING
Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

EVAPOTRANSPIRATION
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

EXPLORATION
Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

FEASIBILITY STUDIES
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

FEDERAL GOVERNMENT
Water Resource Policy Study.
W78-03352 6E

FEDERAL JURISDICTION
Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

Environmental Problems Onshore,
W78-03338 5G

Hooker Chemicals and Plastics Corporation v. Train (Federal Court Review of Environmental Protection Agency Guidelines).
W78-03414 6E

American Iron and Steel Institute v Environmental Protection Agency (Jurisdiction for Judicial Review of Environmental Protection Agency Regulations).
W78-03416 6E

FEDERAL PROJECT POLICY
Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

FEDERAL-STATE WATER RIGHTS
Federal-State Water Rights Conflicts,
W78-03355 6E

FEDERAL-STATE WATER RIGHTS CONFLICTS
Reserved Water Rights - A Solution is Needed,
W78-03353 6E

Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

FEDERAL WATER POLLUTION CONTROL ACT
The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

Water Quality Management Planning: The Fate of 208,
W78-03330 5G

Petroleum Refining Point Source Category Pretreatment Standards for Existing Sources Effluent Guidelines and Standards.
W78-03346 5G

Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

Judicial Maelstrom in Federal Waters: A Composite Interpretation of the Federal Water Pollution Control Act Amendments of 1972,
W78-03356 5G

Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

Hooker Chemicals and Plastics Corporation v. Train (Review of Environmental Protection Agency's New Source Regulations for Phosphate Manufacturing Industry).
W78-03413 6E

Hooker Chemicals and Plastics Corporation v. Train (Federal Court Review of Environmental Protection Agency Guidelines).
W78-03414 6E

American Iron and Steel Institute v Environmental Protection Agency (Jurisdiction for Judicial Review of Environmental Protection Agency Regulations).
W78-03416 6E

FEEDS
Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

FERMENTATION
Oxygen Diffusion and Fermentations,
W78-03216 5D

Anaerobic Processes, (Literature Review),
W78-03218 5D

FERTILIZERS
Sewage Sludge and How to Sell It,
W78-03511 5E

Sludge Composting Projects in U.S. Cities,
W78-03525 5E

Sludge Disposal To Land 'Good Farming Practice'.
W78-03527 5E

Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

Complete Service for Slurry Recycling.
W78-03553 5E

Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

FIELD WATER CAPACITY (SOILS)
Water Capacity of Mountain-Forest and Meadow Soils of the Northern Caucasus, (In Russian),
W78-03345 2G

FILTERS
Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

Sludge Dewatering--A Task the right Equipment Makes Easier.
W78-03510 5D

Highly Advanced Sewage Treatment (Hochentwickelte Abwasserreinigung).
W78-03514 5D

Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

Concrete Stave Tanks.
W78-03552 8F

Rehabilitation of Filter Bed Walls.
W78-03556 8F

FILTRATION
Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

Sludge Dewatering--A Task the right Equipment Makes Easier.
W78-03510 5D

Highly Advanced Sewage Treatment (Hochentwickelte Abwasserreinigung).
W78-03514 5D

Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

Upflow-Downflow Carbon Adsorption,
W78-03533 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

Dissolved Solids in Wastewater,
W78-03567 5B

A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

FINANCING
Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

FINITE DIFFERENCE TECHNIQUE
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

FINITE ELEMENT ANALYSIS
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

FINLAND
Toxicities of Bleaching Effluents Under Finnish Conditions (Toxiciteten hos blekeriavloppsvatten i finska forhallanden),
W78-03305 5C

FISH
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

FISH AND WILDLIFE SERVICE
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

FISH REPRODUCTION
Marine Fish Culture and Artificial Reproduction for the Exploitation of Orbetello (GR) Lagoon, (In Italian),
W78-03235 2I

Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

FISHERIES
Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

FLAME SPECTROMETERS
Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

FLOCCULATION
Automatic Water-Treatment Plant.
W78-03213 5D

Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

FLOOD CONTROL
Carlotto Limited V. County of Ventura (Apportionment of Flood Damage Caused by Negligence).
W78-03382 6E

Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

FLOOD DAMAGE
Carlotto ,Limited V. County of Ventura (Apportionment of Flood Damage Caused by Negligence).
W78-03382 6E

Tri-Chem, Incorporated v Los Angeles County Flood Control District, County of Los Angeles (Duties of Municipalities to Provide Water Runoff Protection for Private Landowners).
W78-03395 6E

Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

FLOOD ROUTING
Routing of Floods in River Channels,
W78-03240 2E

FLOODS
Acid Mine Drainage Treats Sewage Dumped in Streams.
W78-03212 5G

Lange v. Town of Norway (Municipal Liability for Negligent Flooding).
W78-03375 6E

FLORIDA
Northern St. Johns County Coastal Management Plan,
W78-03349 6F

Existing Remedies for Water Pollution,
W78-03372 5G

Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

Florida Safe Drinking Water Act (Proposed Legislation).
W78-03390 6E

FLOTATION
Water Clarification by Flotation,
W78-03223 5D

FLOW CHARACTERISTICS
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

FLOW CONTROL
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

FLOW MEASUREMENT
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

FLOW METERS
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

FLOW RATES
2,4-D in Slow-Moving Water,
W78-03442 5B

Variable Speed Pumping for Process and Main Water Boosting with Accurate Control.
W78-03503 8C

FLOWMETERS
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

FLUCTUATIONS
Periodic Operation of an Activated Sludge Process,
W78-03582 5D

FLUORESCENT DYE
Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

FOREBAYS
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

FORECASTING
'Innovative' Assessment Technology Allows More Accurate Prediction.
W78-03209 5C

The National Dredging Study,
W78-03231 5G

Non-Point Water Quality Modeling in Wildland Management: A State-of-the-Art Assessment (Volume I-Text).
W78-03417 5B

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

FOREIGN COUNTRIES
Sanitation for the Developing Nations.
W78-03530 5D

FOREST WATERSHEDS
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

FORESTS
Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

Retention of Soil Water Following Forest Cutting,
W78-03252 2G

Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

FOUNDATION INVESTIGATIONS
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

FOUR CORNERS POWER PLANT
A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

FOURIER ANALYSIS
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

FRASER RIVER (BRITISH COLUMBIA)
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

FREQUENCY
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

FRESHWATER MARSHES
Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

FRUIT TREES
Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

FUELS
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

Energy Guzzling Sewage Plant Will Fuel Itself.
W78-03522 5D

FUNGI
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

FUTURE PLANNING (PROJECTED)
Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

GALVESTON BAY (TEX)
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

GALVESTON (TEX)
Dredging Operations in the Galveston District,
W78-03229 5G

GAS CHROMATOGRAPHY
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

GENERATORS
Increase in Standby Generation.
W78-03531 8C

GEOCHEMISTRY
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

GEOGRAPHICAL REGIONS
Geographic Areas of Particular Concern.
W78-03273 2L

GEOLOGIC HISTORY
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

GEOMORPHOLOGY
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

GEORGIA
Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

GOOSE CREEK RESERVOIR (SC)
Field Trip, Goose Creek Reservoir,
W78-03433 4A

GOVERNMENT FINANCE
EPA Enlists Army to Manage Sewage Plant Construction.
W78-03625 5G

GOVERNMENTAL INTERRELATIONS
The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

GOVERNMENTS
Reservoir Planning and Operation,
W78-03630 4A

GRAND CANYON
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

GRAND TRAVERSE BAY (MICH)
The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

GRANTS
The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

GREAT LAKES
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

GREAT PLAINS
The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

GREAT SALT LAKE
The Meromictic Great Salt Lake,
W78-03446 2H

GREEN SWAMP (NC)
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

GREENHOUSES
Greywater for the Greenhouse,
W78-03534 5D

GROUNDWATER AVAILABILITY
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

GROUNDWATER BASINS
The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

GROUNDWATER RECHARGE
The Rising Cost of Making Deserts Bloom,
W78-03621 4B

GROUNDWATER RESOURCES
Kansas Groundwater Exploration and Protection Act.
W78-03404 6E

Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

GROUNDWOOD MILLS
Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

HABITATS
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

HAIL
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

HAILSTONES
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

HARBORS
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

HARMONIC METHOD
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

HAW RIVER (NC)
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

HAWAII
The Fight to Save Hawaii's Shorelines,
W78-03354 2L

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

HAZARD ASSESSMENT
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

HAZARDS
Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

Buchanan V. City of Newport Beach (Municipal Responsibility for Surfing Injuries Indirectly Related to Construction of Jetty).
W78-03386 6E

HEATED WATER
Appalachian Power Company V. Train (Review of EPA Regulations Governing Discharge of Heat).
W78-03380 6E

Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

HEAVY METALS
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

Sludge Disposal To Land 'Good Farming Practice'.
W78-03527 5E

Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

Dissolved Solids in Wastewater,
W78-03567 5B

Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

HERBICIDES
Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

2,4-D in Slow-Moving Water,
W78-03442 5B

HIGHWAYS
Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

HISTORY
History of the Aquatic Plant Control Program,
W78-03430 5G

Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

HOLDEN BEACH (NC)
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

HUALAPAI PLATEAU
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

HYDRATED WATER (SOILS)
Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

HYDRAULIC EQUIPMENT
Variable Speed Pumping for Process and Main Water Boosting with Accurate Control.
W78-03503 8C

Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

Model Testing Aids Suction Chamber Design,
W78-03584 8C

HYDRAULIC STRUCTURES
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

HYDRAULIC TRANSPORTATION
Recessed Impeller Pump.
W78-03529 8C

HYDRAULIC VALVES
Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

HYDRILLA VERTICILLATA
Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

HYDROBIOLOGY
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

HYDROGRAPH MODELS
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

HYDROLOGIC ASPECTS
Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

HYDROLOGY
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

HYDROLYSIS
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

HYDROPERIOD
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

HYDROPONICS
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

ILLINOIS
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

IMPELLERS
Recessed Impeller Pump.
W78-03529 8C

INCINERATION
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

Energy Guzzling Sewage Plant Will Fuel Itself.
W78-03522 5D

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

INDIA
Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

INDIAN OCEAN
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

INDIAN RESERVATIONS
Indian Claims in the Beds of Oklahoma Watercourses,
W78-03357 6E

INDIANA
The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

Porter County Chapter of Izaak Walton League of America, Incorporated v. Train (Procedural Rules for Intervenors in Environmental Protection Agency Administrative Hearings).
W78-03377 6E

INDUSTRIAL WASTES
Waste Treatment Process now Available in Canada.
W78-03203 5D

Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

Concentrating Wool Contaminants.
W78-03208 5D

Oxygen Diffusion and Fermentations,
W78-03216 5D

Industrial Effluent Control and Charges,
W78-03217 5G

Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

Pollution and Industrial Waste.
W78-03325 5G

The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

Economic Analysis of Industrial Incentives for Pollution Control: Implications for Water Quality.
W78-03328 5G

Effluent Limitations Guidelines for Existing Sources and Standards of Performance for New Sources.
W78-03331 5G

Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

Hooker Chemicals and Plastics Corporation v. Train (Review of Environmental Protection Agency's New Source Regulations for Phosphate Manufacturing Industry).
W78-03413 6E

Hooker Chemicals and Plastics Corporation v. Train (Federal Court Review of Environmental Protection Agency Guidelines).
W78-03414 6E

INDUSTRIAL WASTES

American Iron and Steel Institute v Environmental Protection Agency (Jurisdiction for Judicial Review of Environmental Protection Agency Regulations).
W78-03416 6E

Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Upflow-Downflow Carbon Adsorption,
W78-03533 5D

Waste Water Survey of a Partially Sewered City,
W78-03559 5B

Dissolved Solids in Wastewater,
W78-03567 5B

Method of Treating Water Containing Chromate,
W78-03592 5D

INDUSTRIAL WATER

Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

INDUSTRIES

Economic Analysis of Industrial Incentives for Pollution Control: Implications for Water Quality.
W78-03328 5G

INFILTRATION

Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

Fibre Mats for Landscape Engineering.
W78-03551 8G

INFILTRATION RATES

Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

INJECTION WELLS

State Underground Injection Control Programs.
W78-03364 5G

INLAND WATERWAYS

Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

INLET MORPHOLOGY

Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

INLETS (WATERWAYS)

Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

INORGANIC COMPOUNDS

Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

DuPont de Nemours Company V. Train (Effluent Limitations Based upon Industry-Wide Regulations Permissible Under Section 301).
W78-03381 6E

INPUT-OUTPUT ANALYSIS

Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

INSECTS

Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

INSTRUMENTATION

Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

INSURANCE

Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

INTERAGENCY COOPERATION

Water Resource Policy Study.
W78-03352 6E

INTERNATIONAL LAW

Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

A Legal Order for the Oceans, II,
W78-03691 6E

Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

INTERNATIONAL WATERS

Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

A Legal Order for the Oceans, II,
W78-03691 6E

Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

INTERSTATE COMPACTS

Sabine River Compact.
W78-03402 6E

Republican River Compact.
W78-03406 6E

Arkansas River Compact.
W78-03407 6E

Arkansas River Basin Compact, Kansas-Oklahoma.
W78-03408 6E

Big Blue River Compact, Kansas-Nebraska.
W78-03409 6E

INTERSTATE RIVERS

Sabine River Compact.
W78-03402 6E

Arkansas River Compact.
W78-03407 6E

INTERSTATE WATER DISPUTES (INDIA)

Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

INTRACOASTAL WATERWAYS

Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

INVESTIGATIONS

Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

INVESTMENT

Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

ION EXCHANGE

Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

Condensate Purification Process,
W78-03608 5D

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

IONIC COMPOSITION

The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,.
W78-03471 2H

IOWA

Water Resource Planning and Rural Water Systems,
W78-03371 6E

IRAN

Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

IRON

Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

IRON ALLOYS
Valves for the Water Industry.
W78-03624 8C

IRON COMPOUNDS
Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

Automatic Water-Treatment Plant.
W78-03213 5D

IRRADIATION
Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

IRRIGATION
The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

Method of Supplemental Irrigation for Farming,
W78-03597 3F

Irrigation Pipe Joint Lock,
W78-03599 3F

Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

IRRIGATION EFFECTS
The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

IRRIGATION EFFICIENCY
Method of Supplemental Irrigation for Farming,
W78-03597 3F

Irrigation Pipe Joint Lock,
W78-03599 3F

Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

IRRIGATION PRACTICES
Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

Irrigation Pipe Joint Lock,
W78-03599 3F

The Rising Cost of Making Deserts Bloom,
W78-03621 4B

Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

IRRIGATION PROGRAMS
Upper Missouri Region, Fiscal Year 1974.
W78-03360 6E

IRRIGATION SYSTEMS
Method of Supplemental Irrigation for Farming,
W78-03597 3F

IRRIGATION WATER
City of Boulder v. Boulder and Left Hand Ditch Company (Rights of Junior Appropriators to Return Flow).
W78-03398 6E

ISLANDS
Bourgeois v. United States (Title to Islands in Non-Navigable Bodies of Water).
W78-03400 6E

ISRAEL
Seepage from Oxidation Ponds,
W78-03472 5B

ITALY (ORBETELLO LAGOON)
Marine Fish Culture and Artificial Reproduction for the Exploitation of Orbetello (GR) Lagoon, (In Italian),
W78-03235 2I

JAPAN (ISHIKARI BAY)
Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

JAPAN (TOKUSHIMA CITY)
Observations on the Overwintering Gambusia Affinis (The Mosquito Fish) in Tokushima City, (In Japanese),
W78-03583 5C

JETTIES
Buchanan V. City of Newport Beach (Municipal Responsibility for Surfing Injuries Indirectly Related to Construction of Jetty).
W78-03386 6E

JORDAN RIVER (UTAH)
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

JUDICIAL DECISIONS
Judicial Maelstrom in Federal Waters: A Composite Interpretation of the Federal Water Pollution Control Act Amendments of 1972,
W78-03356 5G

KALMAN-BUCY FILTERING
Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

KANSAS
Kansas Groundwater Exploration and Protection Act.
W78-03404 6E

State Water Plan Storage Act (Kansas).
W78-03405 6E

Republican River Compact.
W78-03406 6E

Arkansas River Compact.
W78-03407 6E

Arkansas River Basin Compact, Kansas-Oklahoma.
W78-03408 6E

Big Blue River Compact, Kansas-Nebraska.
W78-03409 6E

Appropriation of Water for Beneficial Use.
W78-03410 6E

State Water Plan (Kansas).
W78-03411 6E

The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

KEWEENAW PENINSULA (MICH)
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

KIEV RESERVOIR
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

KINETICS
Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

KRAFT MILLS
Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

LABORATORY TESTS
Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

LAGOONS
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

The Lagoon of Bages-Sigean, A Model of a Mediterranean Lagoon, (In French),
W78-03668 2H

LAKE CONWAY (FL)
Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

LAKE MICHIGAN
Porter County Chapter of Izaak Walton League of America, Incorporated v. Train (Procedural Rules for Intervenors in Environmental Protection Agency Administrative Hearings).
W78-03377 6E

The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

LAKE ONTARIO
Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

LAKE SEDIMENTS
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

LAKE SUPERIOR
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

LAKES
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

LAND DEVELOPMENT
REA Enterprises V. California Coastal Zone Commission (California Coastal Zone Commission Review of Regional Permits).
W78-03384 6E

Carmel Valley View, Limited v. Board of Supervisors, in and for County of Monterey (Denial of Use of Septic Tanks in Proposed Subdivision).
W78-03393 6E

LAND MANAGEMENT
Shore and Beach Management in Louisiana,
W78-03341 2L

North Carolina Coastal Zone Management Act,
W78-03342 2L

Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

LAND RECLAMATION
Management Model for Wastewater Disposal on Land,
W78-03636 5E

LAND SUBSIDENCE
Smith-Southwest Industries V. Friendswood Development Company (Liability of Percolating Water User for Subsidence of Land).
W78-03388 6E

LAND USE
Geographic Areas of Particular Concern.
W78-03273 2L

Water Quality Management Planning: The Fate of 208,
W78-03330 5G

Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

LANDFILLS
State Ex Rel. Brown v. Brookside Reclamation, Incorporated (Exhaustion of Administrative Remedies Required Before Institution of Nuisance Action).
W78-03399 6E

Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

LANDSCAPING
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

LAW ENFORCEMENT
Alaska Pipeline--Financial Responsibility for Oil Spills.
W78-03340 5G

LAW OF THE SEA
A Legal Order for the Oceans, II,
W78-03691 6E

Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

LEACHATE
Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

LEAD RADIOISOTOPES
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

LEGAL REVIEW
Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

LEGISLATION
Industrial Effluent Control and Charges,
W78-03217 5G

Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

Environmental Problems Onshore,
W78-03338 5G

Oil Pollution Liability Legislation Transmitted to the Congress,
W78-03343 5G

The Fight to Save Hawaii's Shorelines,
W78-03354 2L

Judicial Maelstrom in Federal Waters: A Composite Interpretation of the Federal Water Pollution Control Act Amendments of 1972,
W78-03356 5G

Republican River Compact.
W78-03406 6E

Water Quality Act.
W78-03412 6E

Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

LIGHT
Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

LIGHT PENETRATION
Irradiance Measurements in the Upper Ocean,
W78-03468 2L

LIGHT SCATTERING TECHNIQUE
Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

LIGNINS
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

LIGNOSULFONATES
Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

LIME
Automatic Water-Treatment Plant.
W78-03213 5D

Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

LIMITED DATA
Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

LIMNOLOGY
The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

LININGS
A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

Elastomeric Membranes,
W78-03536 8G

Glass Lined Tanks Gain Popularity.
W78-03555 8G

LIQUID WASTES
Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

LOBLOLLY PINE TREES
Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

LOCH LEVEN (SCOTLAND)
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

LONG ISLAND SOUND
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

LOUISIANA
Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

Shore and Beach Management in Louisiana,
W78-03341 2L

Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

LOWER VOLGA (USSR)
Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

MACROPHYTES
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

MAGNETIC STUDIES
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

MALAYSIA (PENANG ISLAND)
Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

MANAGEMENT PRACTICES
Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

MAPPING
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

Water Table Mapping User's Manual,
W78-03484 7C

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

MAPS
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

Development of Water Resources in Appalachia.
W78-03675 6B

MARGINAL PRODUCTIVITY
Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

MARINE FISH
Marine Fish Culture and Artificial Reproduction for the Exploitation of Orbetello (GR) Lagoon, (In Italian),
W78-03235 2I

MARKING TECHNIQUES
Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

MARSH PLANTS
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

MASS SPECTROMETRY
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

MASS TRANSFER
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

MASSACHUSETTS
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

MASSACHUSETTS BAY
A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

MATHEMATICAL MODELS
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

Periodic Operation of an Activated Sludge Process,
W78-03582 5D

Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

Management Model for Wastewater Disposal on Land,
W78-03636 5E

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

MEADOW SOILS
Water Capacity of Mountain-Forest and Meadow Soils of the Northern Caucasus, (In Russian),
W78-03345 2G

MEASUREMENT
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

MEDITERRANEAN LAGOONS
The Lagoon of Bages-Sigean, A Model of a Mediterranean Lagoon, (In French),
W78-03668 2H

MELTING
Thermal Regime of Prairie Snowcover,
W78-03460 2C

MEMBRANE PROCESSES
Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

MEMBRANES
Reverse Osmosis Membrane,
W78-03606 3A

MERCURY
Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

MEROMIXIS
The Meromictic Great Salt Lake,
W78-03446 2H

METALS
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

METHODOLOGY
Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

MEXICO
Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

MICROBIAL DEGRADATION
Anaerobic Processes, (Literature Review),
W78-03218 5D

Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

MICROBIAL DEGRADATION

Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

MICROORGANISMS

Oxygen Diffusion and Fermentations,
W78-03216 5D

Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

MINE WASTES

Acid Mine Drainage Treats Sewage Dumped in Streams.
W78-03212 5G

Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

MINE WATER

Automatic Water-Treatment Plant.
W78-03213 5D

Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

MINERALOGY

Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

MINERALS (SOILS)

Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

MINING

Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

MISSISSIPPI

Mississippi State Highway Commission v. Tyner (Owners of Land Bordering Natural Watercourses May Increase and Accelerate Surface Water Drainage without Liability).
W78-03376 6E

Save the Bay, Incorporated v. Mississippi Air and Water Pollution Control Commission (Hearing Requirements for Discharge Permits Under NPDES).
W78-03378 6E

Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

MISSISSIPPI RIVER

Shore and Beach Management in Louisiana,
W78-03341 2L

MIXING

Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

MODEL STUDIES

Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

Optimal Scheduling of Water Supply Projects,
W78-03241 4A

Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

Water Table Mapping User's Manual,
W78-03484 7C

A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

Periodic Operation of an Activated Sludge Process,
W78-03582 5D

A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

Stochastic Models for Reservoir Design,
W78-03631 4A

Urban Stormwater Management,
W78-03632 5G

Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

MOISTURE CONTENT

The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

MOISTURE UPTAKE

Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

MOLLUSKS

Fauna and Densities of Molluscs in Some Mountain Waters in the Surroundings of Dombas (South Norway), (In German),
W78-03669 5B

MOMENTUM TRANSFER

The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

MONITORING

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

Ultrasonic Sludge Dip Stick.
W78-03561 5A

How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

Water Monitor System: Phase I Test Report,
W78-03663 5A

Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

Tracking Pollutants from a Distance,
W78-03670 5A

A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

MONOMOLECULAR FILMS

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

MONTANA

Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

MONTANA (BOZEMAN FAN)
The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

MOSQUITO FISH
Observations on the Overwintering Gambusia Affinis (The Mosquito Fish) in Tokushima City, (In Japanese),
W78-03583 5C

MOUNTAIN WATERS
Fauna and Densities of Molluscs in Some Mountain Waters in the Surroundings of Dombas (South Norway), (In German),
W78-03669 5B

MUNICIPAL WASTES
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Sanitation for the Developing Nations.
W78-03530 5D

Upflow-Downflow Carbon Adsorption,
W78-03533 5D

Waste Water Survey of a Partially Sewered City,
W78-03559 5B

Dissolved Solids in Wastewater,
W78-03567 5B

Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

MUNICIPAL WATER
Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

MURDOCK BASIN (TEX)
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

MUTAGENICITY
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

MYRIOPHYLLUM-SPICATUM
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

MYXIDIUM-RHODEI
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

NATURAL FLOW DOCTRINE
Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

NATURAL GAS
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

NAVIGABLE WATERS
Dredging Operations in the Galveston District,
W78-03229 5G

Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

Lane V. City of Redondo Beach (Municipality Prohibited from Interfering with Public Access to Tidelands or Navigable Waters).
W78-03383 6E

Marl, Sand, Gravel, Shell and Mudshell.
W78-03403 6E

NEBRASKA
Big Blue River Compact, Kansas-Nebraska.
W78-03409 6E

The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

NEEDLERUSH
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

NEGLIGENCE
Lange v. Town of Norway (Municipal Liability for Negligent Flooding).
W78-03375 6E

Carlotto Limited V. County of Ventura (Apportionment of Flood Damage Caused by Negligence).
W78-03382 6E

Tri-Chem, Incorporated v Los Angeles County Flood Control District, County of Los Angeles (Duties of Municipalities to Provide Water Runoff Protection for Private Landowners).
W78-03395 6E

NETWORKS
Welsh Water Re-organization.
W78-03623 5G

NEUTRALIZATION
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

NEUTRON ACTIVATION ANALYSIS
Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

NEW MEXICO
Water Quality Act.
W78-03412 6E

A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

NEW YORK HARBOR
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

NITRATES
Biological Denitrification of Water,
W78-03604 5D

NITRIFICATION
Anaerobic Processes, (Literature Review),
W78-03218 5D

Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

Elimination of Nitrogen CPDS. From Waste Water--By Downwards Passage Through Biological Treatment Units in a Suitable Atmos.
W78-03501 5D

Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

NITROGEN COMPOUNDS
Elimination of Nitrogen CPDS. From Waste Water--By Downwards Passage Through Biological Treatment Units in a Suitable Atmos.
W78-03501 5D

NITROGEN MINERALIZATION
Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

NON-NAVIGABLE WATERS
Bourgeois v. United States (Title to Islands in Non-Navigable Bodies of Water).
W78-03400 6E

NORTH CAROLINA
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

North Carolina Coastal Zone Management Act,
W78-03342 2L

Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

NORTHERN HEMISPHERE
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

NORWAY
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

NORWEGIAN LAKES
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

NUCLEAR POWERPLANTS
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

NUMERICAL ANALYSIS
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

NUTRIENT REMOVAL
Removing Phosphates from Effluent by the Activated Sludge Process--With Countercurrent Extn. of the Phosphate Contg. Sludge.
W78-03499 5D

Elimination of Nitrogen CPDS. From Waste Water--By Downwards Passage Through Biological Treatment Units in a Suitable Atmos.
W78-03501 5D

Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

Sludge Disposal To Land 'Good Farming Practice'.
W78-03527 5E

Greywater for the Greenhouse,
W78-03534 5D

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

Complete Service for Slurry Recycling.
W78-03553 5E

Soil's Natural Processes Can Clean Wastes from Sewage Water.
W78-03558 5D

NUTRIENT TRANSPORT
Barataria Basin: Biological Characterization,
W78-03289 5C

NUTRIENTS
Sewage Sludge and How to Sell It,
W78-03511 5E

OCCUPATIONAL SAFETY AND HEALTH
Registry of Toxic Effects of Chemical Substances, 1976 Edition.
W78-03679 5A

OCEAN CURRENTS
On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

OCEAN DUMPING
Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

OCEAN WAVES
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

OCEANOGRAPHIC DATA
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

OCEANOGRAPHY
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

OCEANS
The United Nations Environment Program: The Mediterranean Conferences,
W78-03336 6E

Final Revision of Regulations and Criteria for Ocean Dumping.
W78-03369 5G

Irradiance Measurements in the Upper Ocean,
W78-03468 2L

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

Marine Pollution: A Multi-Faceted, Multi-Agency Detection, Research and Enforcement Program.
W78-03628 5G

Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

OFFSHORE PLATFORMS
Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

OHIO
State Ex Rel. Brown v. Brookside Reclamation, Incorporated (Exhaustion of Administrative Remedies Required Before Institution of Nuisance Action).
W78-03399 6E

OHIO RIVER
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

OIL
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

OIL FIELDS
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

OIL INDUSTRY
Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

Environmental Problems Onshore,
W78-03338 5G

Petroleum Refining Point Source Category Pretreatment Standards for Existing Sources Effluent Guidelines and Standards.
W78-03346 5G

No Oil, Incorporated V. Occidental Petroleum Corporation (Exemptions from Permit Requirements Under the California Coastal Zone Conservation Act).
W78-03385 6E

OIL POLLUTION
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

Ultimate Disposal of Oil and Hazardous Materials,
W78-03283 5E

Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

Oil Pollution Liability Legislation Transmitted to the Congress,
W78-03343 5G

Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

Oil Water Separator,
W78-03619 5G

Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

OIL SPILLS
Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

Alaska Pipeline--Financial Responsibility for Oil Spills.
W78-03340 5G

Oil Pollution Liability Legislation Transmitted to the Congress,
W78-03343 5G

Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

Oil Spill Recovery Method and Apparatus,
W78-03600 5G

OIL WASTES

Marine Pollution: A Multi-Faceted, Multi-Agency Detection, Research and Enforcement Program.
W78-03628 5G

Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

OILY WATER

Oil Spill Recovery Method and Apparatus,
W78-03600 5G

Oil Water Separator,
W78-03619 5G

OKLAHOMA

Indian Claims in the Beds of Oklahoma Watercourses,
W78-03357 6E

Arkansas River Basin Compact, Kansas-Oklahoma.
W78-03408 6E

Reconnaissance Survey of Aquatic Weed Infestations in Lakes and Navigable Streams in Oklahoma,
W78-03435 5G

ON-SITE INVESTIGATIONS

Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

OPERATION AND MAINTENANCE

Dredging Operations in the Galveston District,
W78-03229 5G

The Twin-Tunnel Concept.
W78-03496 8A

Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

OPTIMIZATION

Routing of Floods in River Channels,
W78-03240 2E

Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

Stochastic Models for Reservoir Design,
W78-03631 4A

Urban Stormwater Management,
W78-03632 5G

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

OREGON

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

ORGANIC COMPOUNDS

Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

ORGANIC MATTER

Co-Disposal of Sewage Sludge and Solid Wastes--It Works.
W78-03512 5E

ORGANIC WASTES

Waste Treatment Process now Available in Canada.
W78-03203 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

The Foundations of Organic Pollutant Analysis,
W78-03671 5A

OUTER CONTINENTAL SHELF

A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

OUTFALL SEWERS

Submarine Pipeline for River Wear.
W78-03554 5E

Sea Outfall for Dorset.
W78-03557 5E

Waste Water Survey of a Partially Sewered City,
W78-03559 5B

OUTLETS

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

OVERLAND FLOW

Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

OVERTREE SPRINKLING

Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

OWNERSHIP OF BEDS

Indian Claims in the Beds of Oklahoma Watercourses,
W78-03357 6E

Bourgeois v. United States (Title to Islands in Non-Navigable Bodies of Water).
W78-03400 6E

OXIDATION

Waste Treatment Process now Available in Canada.
W78-03203 5D

Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

OXIDATION

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

OXIDATION LAGOONS

Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

Seepage from Oxidation Ponds,
W78-03472 5B

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

OXYGEN CONSUMPTION (MOLLUSKS)

Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

OXYGENATION

Oxygen Diffusion and Fermentations,
W78-03216 5D

The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

OZONE

The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

PACIFIC OCEAN

Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

Irradiance Measurements in the Upper Ocean,
W78-03468 2L

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

PACKED BEDS

Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

PADRE ISLAND (TEX)

Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

PAPER MILLS

New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

PARTICLE SIZE

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

PARTICULATE DISCRIMINATION

Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

PATENTS

Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

Bleach Plant Filtrate Recovery,
W78-03322 5D

Sewage Channel Bar Screen Rake--Raisable by Chain Along Rearward Swivelling Carrier on Cantilever with Power Cylinder Drive.
W78-03498 5D

Removing Phosphates from Effluent by the Activated Sludge Process--With Countercurrent Extn. of the Phosphate Contg. Sludge.
W78-03499 5D

Aeration Tank for Activated Sludge Treatment of Waste Water--Is Smaller and Requires Less Power for a Given Treatment Capacity.
W78-03500 5D

Elimination of Nitrogen CPDS. From Waste Water--By Downwards Passage Through Biological Treatment Units in a Suitable Atmos.
W78-03501 5D

Vertical Axis Aerating Rotor for Waste Water--Can be Operated at Higher Speeds than Previous Inverted Cone Turbine Rotors.
W78-03502 5D

Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

Method of Treating Water Containing Chromate,
W78-03592 5D

Dewatering Clay Slurries,
W78-03593 5D

Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

Water Sampler Device,
W78-03596 7B

Method of Supplemental Irrigation for Farming,
W78-03597 3F

Water Purification System Utilizing Ultraviolet Radiation,
W78-03598 5F

Irrigation Pipe Joint Lock,
W78-03599 3F

Oil Spill Recovery Method and Apparatus,
W78-03600 5G

Cryogenic Sediment Sampler,
W78-03601 2J

Apparatus for the Electrolysis of Water Which Operates Under Pressure,
W78-03602 5F

Biological Denitrification of Water,
W78-03604 5D

Method for Destratifying Bodies of Water,
W78-03605 5G

Reverse Osmosis Membrane,
W78-03606 3A

Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

Condensate Purification Process,
W78-03608 5D

Water Purification Device,
W78-03609 5F

Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

Underwater Thermal Energy Conversion Unit,
W78-03614 8C

Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

Method for Controlling the Growth of Aquatic Plants,
W78-03616 4A

Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

Oil Water Separator,
W78-03619 5G

PATH OF POLLUTANTS

Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

Waste Water Survey of a Partially Sewered City,
W78-03559 5B

Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

PATHOGENIC FUNGI

Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

PEAT

The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

PENALTIES (LEGAL)

Alaska Pipeline--Financial Responsibility for Oil Spills.
W78-03340 5G

Existing Remedies for Water Pollution,
W78-03372 5G

PERCH

Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

PERCOLATING WATER

Smith-Southwest Industries V. Friendswood Development Company (Liability of Percolating Water User for Subsidence of Land).
W78-03388 6E

PERMEABILITY

Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

PERMITS

Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

Final Revision of Regulations and Criteria for Ocean Dumping.
W78-03369 5G

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

Porter County Chapter of Izaak Walton League of America, Incorporated v. Train (Procedural Rules for Intervenors in Environmental Protection Agency Administrative Hearings).
W78-03377 6E

Save the Bay, Incorporated v. Mississippi Air and Water Pollution Control Commission (Hearing Requirements for Discharge Permits Under NPDES).
W78-03378 6E

REA Enterprises V. California Coastal Zone Commission (California Coastal Zone Commission Review of Regional Permits).
W78-03384 6E

No Oil, Incorporated V. Occidental Petroleum Corporation (Exemptions from Permit Requirements Under the California Coastal Zone Conservation Act).
W78-03385 6E

Twin Lake Reservoir and Canal Company v. City of Aspen (Intent and Physical Act Required for Appropriation).
W78-03401 6E

PESTICIDE RESIDUES

Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

2,4-D in Slow-Moving Water,
W78-03442 5B

Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

PETROCHEMICALS INDUSTRY

Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

PHENOLS

Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

PHOSPHATES

Hooker Chemicals and Plastics Corporation v. Train (Review of Environmental Protection Agency's New Source Regulations for Phosphate Manufacturing Industry).
W78-03413 6E

Hooker Chemicals and Plastics Corporation v. Train (Federal Court Review of Environmental Protection Agency Guidelines).
W78-03414 6E

Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

Removing Phosphates from Effluent by the Activated Sludge Process--With Countercurrent Extn. of the Phosphate Contg. Sludge.
W78-03499 5D

Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

PHOSPHORUS

Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

PHOTOGRAMMETRY

Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

PHOTOMETRY

Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

PHOTORESPIRATION

Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

PHOTOSYNTHESIS

Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

PHYSICAL PROPERTIES

Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

PHYTOPLANKTON

Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

PHYTOSOCIOLOGY
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

PICEA-SCHRENKIANA
Alteration of Environmental Conditions in Cleared Narrow Strips in Spruce Forests of the Tien-Shan, (In Russian),
W78-03301 4C

PILOT PLANTS
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

Water Clarification by Flotation,
W78-03223 5D

Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

PINUS-RESINOSA
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

PIPELINE
Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

PIPELINES
Pipework Flexibility,
W78-03495 8G

Submarine Pipeline for River Wear.
W78-03554 5E

Sea Outfall for Dorset.
W78-03557 5E

Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

PIPES
A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

Cast-in-Place Pipe Uses Trench as Form.
W78-03494 8F

Glass Reinforced Concrete Pipes.
W78-03497 8F

PLANKTON DREDGE SAMPLING
A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

PLANNING
The United Nations Environment Program: The Mediterranean Conferences,
W78-03336 6E

Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

Reservoir Planning and Operation,
W78-03630 4A

Stochastic Models for Reservoir Design,
W78-03631 4A

Urban Stormwater Management,
W78-03632 5G

Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

PLANT GROWTH
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

Salt-Marsh Plant Geratology,
W78-03654 2L

PLASTIC PIPES
Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

PLASTICS
Tank Accessories in Plastic.
W78-03528 8G

PLUM ISLAND (MASS)
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

POCOSIN
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

POINT SENSORS
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

POLAND
Limnological Aspect of Water Reservoirs of the Lake Region Between Leczna and Wlodawa. Part I, (In Polish),
W78-03272 2H

Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

POLAROGRAPHIC ANALYSIS
Trace Analysis of Arsenic by Colorimetry, Atomic Absorption and Polarography,
W78-03665 5A

POLITICAL ASPECTS
Reservoir Planning and Operation,
W78-03630 4A

POLLUTANT IDENTIFICATION
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

Chemical Analyses for Water Pollutants: Training Manual.
W78-03261 5A

Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

Water Monitor System: Phase I Test Report,
W78-03663 5A

Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

Trace Analysis of Arsenic by Colorimetry, Atomic Absorption and Polarography,
W78-03665 5A

Identification of Selected Federal Activities Directed to Chemicals of Near-Term Concern (Benzene, Bis(Chloromethyl) Ether, Cadmium, Hydrogen Sulfide, Mercury, Platinum, Polynuclear Aromatic Hydrocarbons, Trichloroethylene, Tris (2,3-Dibromopropyl), Phosphate).
W78-03666 5A

Tracking Pollutants from a Distance,
W78-03670 5A

The Foundations of Organic Pollutant Analysis,
W78-03671 5A

Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

Registry of Toxic Effects of Chemical Substances, 1976 Edition.
W78-03679 5A

The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

POLLUTANTS

Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

Tracking Pollutants from a Distance,
W78-03670 5A

The Foundations of Organic Pollutant Analysis,
W78-03671 5A

POLLUTION ABATEMENT

Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

Pollution and Industrial Waste.
W78-03325 5G

Economic Analysis of Industrial Incentives for Pollution Control: Implications for Water Quality.
W78-03328 5G

Existing Remedies for Water Pollution,
W78-03372 5G

POLLUTION DETECTION

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

POLLUTION MONITORING

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

POLYCHLORINATED BIPHENYLS

The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

POLYMERS

Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

PONDS

Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

POROUS MEDIA

Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

POST-IMPOUNDMENT

Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

POTABLE WATER

Death of the Sweet Waters,
W78-03326 5G

Florida Safe Drinking Water Act (Proposed Legislation).
W78-03390 6E

International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

POTAMOGETON-PERFOLIATUS

The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

POWER OPERATION AND MAINTENANCE

Turbine Standby for Water and Sewage Plants.
W78-03520 8C

Increase in Standby Generation.
W78-03531 8C

PRAIRIE SNOWCOVER

Thermal Regime of Prairie Snowcover,
W78-03460 2C

PRE-TREATMENT (WATER)

Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

PRECIPITATION (ATMOSPHERIC)

The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

PRETREATMENT (WATER)

Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

PRICING

A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

PRIMARY PRODUCTIVITY

Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

Salt-Marsh Plant Geratology,
W78-03654 2L

Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

PRIOR APPROPRIATION

Reserved Water Rights - A Solution is Needed,
W78-03353 6E

Federal-State Water Rights Conflicts,
W78-03355 6E

City of Grand Junction v. Kannah Creek Association (Right to Change Beneficial Use of Appropriated Waters).
W78-03396 6E

City of Boulder v. Boulder and Left Hand Ditch Company (Rights of Junior Appropriators to Return Flow).
W78-03398 6E

PRIOR APPROPRIATION

Appropriation of Water for Beneficial Use.
W78-03410 6E

PROGRAMMING
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

PROGRAMS
The National Dredging Study,
W78-03231 5G

PROJECT PLANNING
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

Channel Modification Guidelines.
W78-03350 4A

Sabine River Compact.
W78-03402 6E

Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

PROJECTS
Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

Environmental Research Outlook (FY 1977 Through FY 1981).
W78-03695 5G

PROTOTYPE TESTS
Model Testing Aids Suction Chamber Design,
W78-03584 8C

PSEUDOMONAS
Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

PUBLIC ACCESS
The Fight to Save Hawaii's Shorelines,
W78-03354 2L

Lane V. City of Redondo Beach (Municipality Prohibited from Interfering with Public Access to Tidelands or Navigable Waters).
W78-03383 6E

PUBLIC HEALTH
State Underground Injection Control Programs.
W78-03364 5G

International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

PUBLIC LANDS
Rest Area Wastewater Treatment,
W78-03516 5D

PUBLIC UTILITY DISTRICTS
Pleasant View Utility District V. Vradenburg (Recovery for Taking of Flowage Easement Barred by Statute of Limitations).
W78-03389 6E

PUBLICATIONS
Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

PUERTO RICO
Aquatic Plant Problems in Puerto Rico,
W78-03434 4A

PUGET SOUND
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

PUGET SOUND (WASH)
Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

PULP AND PAPER INDUSTRY
Starch Recovery Exceeds 90% with Liquid Cyclone System.
W78-03202 5D

'Innovative' Assessment Technology Allows More Accurate Prediction.
W78-03209 5C

State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

PULP MILLS
New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

PULP WASTES
'Innovative' Assessment Technology Allows More Accurate Prediction.
W78-03209 5C

Inclined Screen for Waste Water Purification (Schraegsieb zur Abwasserreinigung),
W78-03290 5D

Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

Difficulty Decomposed Toxic Substances from the Pulp and Paper Industry (Svarnedbrytbara, toxiska amnen fran pappers- och cellulosaindustrin),
W78-03306 5C

Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

Sewage Fungus Growth in Rivers Receiving Paper Mill Effluent,
W78-03323 5C

PULPING WASTES
Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

PUMP TESTING
Model Testing Aids Suction Chamber Design,
W78-03584 8C

PUMPING
Variable Speed Pumping for Process and Main Water Boosting with Accurate Control.
W78-03503 8C

Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

Increase in Standby Generation.
W78-03531 8C

Model Testing Aids Suction Chamber Design,
W78-03584 8C

PUMPING PLANTS
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

PUMPS
Variable Speed Pumping for Process and Main Water Boosting with Accurate Control.
W78-03503 8C

Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

Recessed Impeller Pump.
W78-03529 8C

QUALITY CONTROL
Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

RADAR
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

RADIATION
Irradiating Dried Sludge Could Benefit Environment, Save Energy.
W78-03526 5D

RADIOACTIVITY
Strontium-90 Concentrations in the Bottom Brinc and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

RADIOISOTOPES
Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

RADIOMETRIC MEASUREMENTS
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

RATES OF APPLICATIONS
Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

RATIONAL METHOD
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

RAYON
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

REAERATION
Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

REASONABLE USE
Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

RECLAIMED WATER
State Board Adopts Comprehensive Action Plan (Wastewater Reclamation),
W78-03363 5G

RECLAMATION
Upper Missouri Region, Fiscal Year 1974.
W78-03360 6E

RECLAMATION STATES
Upper Missouri Region, Fiscal Year 1974.
W78-03360 6E

RECOVERY STUDIES
Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

RECREATION
Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

RECREATION DEMAND
Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

RECREATION FACILITIES
Rest Area Wastewater Treatment,
W78-03516 5D

RECREATION WASTES
Rest Area Wastewater Treatment,
W78-03516 5D

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

RECYCLING
Waste Treatment Process now Available in Canada.
W78-03203 5D

Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

Energy Guzzling Sewage Plant Will Fuel Itself.
W78-03522 5D

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

REGIONAL ANALYSIS
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

ORSANCO: An Interstage Agency,
W78-03626 5G

REGIONAL ECONOMICS
Welsh Water Re-organization.
W78-03623 5G

REGIONAL PLANNING
Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

REGRESSION ANALYSIS
Ownership and Water System Operation,
W78-03647 6C

REGULATION
Effluent Limitations Guidelines for Existing Sources and Standards of Performance for New Sources.
W78-03331 5G

Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

Environmental Problems Onshore,
W78-03338 5G

River Shore Dynamics, (In Swedish),
W78-03339 4C

North Carolina Coastal Zone Management Act,
W78-03342 2L

Petroleum Refining Point Source Category Pretreatment Standards for Existing Sources Effluent Guidelines and Standards.
W78-03346 5G

Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

Appalachian Power Company V. Train (Review of EPA Regulations Governing Discharge of Heat).
W78-03380 6E

Florida Safe Drinking Water Act (Proposed Legislation).
W78-03390 6E

Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

Ownership and Water System Operation,
W78-03647 6C

Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

REGULATIONS
Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

REMEDIES
Existing Remedies for Water Pollution,
W78-03372 5G

REMOTE SENSING
Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

Tracking Pollutants from a Distance,
W78-03670 5A

Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

RESEARCH AND DEVELOPMENT
A New Concept for Dredged Material Disposal,
W78-03228 5E

Research Needs in Erosion and Sedimentation.
W78-03248 2J

Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

Environmental Research Outlook (FY 1977 Through FY 1981).
W78-03695 5G

RESEARCH NEEDS (EROSION AND SEDIMENTATION)
Research Needs in Erosion and Sedimentation.
W78-03248 2J

RESEARCH PRIORITIES
Environmental Research Outlook (FY 1977 Through FY 1981).
W78-03695 5G

RESEARCH PROGRAMS
Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

RESEARCH PROJECTS
Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

RESERVATION DOCTRINE
Reserved Water Rights - A Solution is Needed,
W78-03353 6E

Federal-State Water Rights Conflicts,
W78-03355 6E

RESERVOIR DESIGN
Stochastic Models for Reservoir Design,
W78-03631 4A

RESERVOIR OPERATION
Reservoir Planning and Operation,
W78-03630 4A

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

RESERVOIR RELEASES
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

RESERVOIR STORAGE
State Water Plan Storage Act (Kansas).
W78-03405 6E

Artesian Wells.
W78-03415 6E

RESIDUES
Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

RESOURCE ASSESSMENT
Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

RESOURCES
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

RESOURCES DEVELOPMENT
A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

RETURN FLOW
Water Reuse in the Southwest,
W78-03219 5G

City of Boulder v. Boulder and Left Hand Ditch Company (Rights of Junior Appropriators to Return Flow).
W78-03398 6E

Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

Greywater for the Greenhouse,
W78-03534 5D

Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

Soil's Natural Processes Can Clean Wastes from Sewage Water.
W78-03558 5D

The Rising Cost of Making Deserts Bloom,
W78-03621 4B

REVERSE OSMOSIS
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

Reverse Osmosis Membrane,
W78-03606 3A

REVIEWS
Anaerobic Processes, (Literature Review),
W78-03218 5D

Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

RIPARIAN HABITAT
Importance, Preservation and Management of Riparian Habitat: A Symposium, Tucson, Arizona, July 9, 1977.
W78-03661 4C

RIPARIAN LAND
Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

Mississippi State Highway Commission v. Tyner (Owners of Land Bordering Natural Watercourses May Increase and Accelerate Surface Water Drainage without Liability).
W78-03376 6E

RIPARIAN PLANTS
Importance, Preservation and Management of Riparian Habitat: A Symposium, Tucson, Arizona, July 9, 1977.
W78-03661 4C

RIPARIAN RIGHTS
Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

RISKS
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the

Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

RIVER BASIN COMMISSIONS
Arkansas River Basin Compact, Kansas-Oklahoma.
W78-03408 6E

RIVER BASIN DEVELOPMENT
Republican River Compact.
W78-03406 6E

Arkansas River Basin Compact, Kansas-Oklahoma.
W78-03408 6E

Big Blue River Compact, Kansas-Nebraska.
W78-03409 6E

RIVER BASINS
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

Stochastic Models for Reservoir Design,
W78-03631 4A

RIVER BEDS
Indian Claims in the Beds of Oklahoma Watercourses,
W78-03357 6E

RIVER REGULATION
Arkansas River Compact.
W78-03407 6E

RIVER SHORES
River Shore Dynamics, (In Swedish),
W78-03339 4C

RIVERS
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

ROACH
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

ROADS
Rest Area Wastewater Treatment,
W78-03516 5D

ROOT DEVELOPMENT
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

ROOT PRODUCTIVITY
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

ROTORS
Vertical Axis Aerating Rotor for Waste Water--Can be Operated at Higher Speeds than Previous Inverted Cone Turbine Rotors.
W78-03502 5D

RUFF
Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

RUNOFF
Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

RURAL AREAS
Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

SAANICH INLET (BRITISH COLUMBIA)
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

SAFETY
Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

SAGEBRUSH
Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

SALINE SOILS
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

SALINE WATER
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

SALINE WATER INTRUSION
Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

SALINITY
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

SALMONELLA
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

SALT MARSHES
Salt-Marsh Plant Geratology,
W78-03654 2L

SALT TOLERANCE
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

SAMPLING
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

Water Sampler Device,
W78-03596 7B

Cryogenic Sediment Sampler,
W78-03601 2J

Water Monitor System: Phase I Test Report,
W78-03663 5A

SAN FRANCISCO BAY
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

SATELLITES (ARTIFICIAL)
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

SAVANNAH (GA)
Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

SCHEDULING
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

SCREENING
Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

SCREENS
Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

Inclined Screen for Waste Water Purification (Schraegsieb zur Abwasserreinigung),
W78-03290 5D

Fine Screening at the Inlet--A Way to Reduce Construction and Modernization Costs of Small Clarifier Installations (Feinsiebung im Zulauf--ein Weg zur Senkung von Neubau- und Sanierungskosten kleinerer Klaeranlagen),
W78-03291 5D

Sewage Channel Bar Screen Rake--Raisable by Chain Along Rearward Swivelling Carrier on Cantilever with Power Cylinder Drive.
W78-03498 5D

Treatment Facilities Expanded at Denver Sewage District.
W78-03505 5D

Developments in the Treatment of Effluent,
W78-03506 5D

SEA MARKERS
Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

SEA OF JAPAN
Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

SEA WATER
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

SEALANTS
Elastomeric Membranes,
W78-03536 8G

SEDIMENT DEPOSITION
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

SEDIMENT TRANSPORT
A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

SEDIMENT-WATER INTERFACES
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

SEDIMENTARY STRUCTURES
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

SEDIMENTATION
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

Research Needs in Erosion and Sedimentation.
W78-03248 2J

SEDIMENTATION RATES
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

SEDIMENTS
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Marl, Sand, Gravel, Shell and Mudshell.
W78-03403 6E

Cryogenic Sediment Sampler,
W78-03601 2J

SEEPAGE
Carmel Valley View, Limited v. Board of Supervisors, in and for County of Monterey (Denial of Use of Septic Tanks in Proposed Subdivision).
W78-03393 6E

Seepage from Oxidation Ponds,
W78-03472 5B

SEISMIC WAVES
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

SEPARATION TECHNIQUES
Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

Water Clarification by Flotation,
W78-03223 5D

Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

Oil Water Separator,
W78-03619 5G

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

SEPTIC TANKS
Carmel Valley View, Limited v. Board of Supervisors, in and for County of Monterey (Denial of Use of Septic Tanks in Proposed Subdivision).
W78-03393 6E

Sanitation for the Developing Nations.
W78-03530 5D

Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

SETTLING BASINS
Ellison v City of San Buenaventura (No Cause of Action for Lower Riparian Owner Under Reasonable Use Doctrine).
W78-03394 6E

Tank Accessories in Plastic.
W78-03528 8G

Lisnaskea Sewage-Treatment Works,
W78-03542 5D

Ultrasonic Sludge Dip Stick.
W78-03561 5A

SEWAGE
Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

SEWAGE BACTERIA
Irradiating Dried Sludge Could Benefit Environment, Save Energy.
W78-03526 5D

Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

SEWAGE DISPOSAL
Marine Pollution: A Multi-Faceted, Multi-Agency Detection, Research and Enforcement Program.
W78-03628 5G

SEWAGE EFFLUENTS
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

SEWAGE LAGOONS
Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

Fibre Mats for Landscape Engineering.
W78-03551 8G

SEWAGE TREATMENT
Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

Treatment Facilities Expanded at Denver Sewage District.
W78-03505 5D

Rest Area Wastewater Treatment,
W78-03516 5D

Sludge Composting Projects in U.S. Cities,
W78-03525 5E

Sanitation for the Developing Nations.
W78-03530 5D

Submarine Pipeline for River Wear.
W78-03554 5E

Sea Outfall for Dorset.
W78-03557 5E

Soil's Natural Processes Can Clean Wastes from Sewage Water.
W78-03558 5D

Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

Welsh Water Re-organization.
W78-03623 5G

Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

SEWERAGE
Industrial Effluent Control and Charges,
W78-03217 5G

Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

Glass Reinforced Concrete Pipes.
W78-03497 8F

Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

SEWERS
Acid Mine Drainage Treats Sewage Dumped in Streams.
W78-03212 5G

A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

Cast-in-Place Pipe Uses Trench as Form.
W78-03494 8F

Pipework Flexibility,
W78-03495 8G

The Twin-Tunnel Concept.
W78-03496 8A

SHIPS
Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

SHOALS
Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

SHORE PROTECTION
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

Shore and Beach Management in Louisiana,
W78-03341 2L

Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

Northern St. Johns County Coastal Management Plan,
W78-03349 6F

The Fight to Save Hawaii's Shorelines,
W78-03354 2L

Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

SHORES
Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

SILVER
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

SILVER FLOWE (SCOTLAND)
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

SILVEX
Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

SIMULATION ANALYSIS
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

Stochastic Models for Reservoir Design,
W78-03631 4A

Urban Stormwater Management,
W78-03632 5G

Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

SLACK WATER SEDIMENTATION
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

SLIME
Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

SLOW-RELEASE TREATMENT
Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

SLUDGE
Earthworms to Aid Sludge Disposal.
W78-03221 5E

Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

SLUDGE DIGESTION
Sludge Composting Projects in U.S. Cities,
W78-03525 5E

SLUDGE DISPOSAL
Earthworms to Aid Sludge Disposal.
W78-03221 5E

Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

Treatment Facilities Expanded at Denver Sewage District.
W78-03505 5D

Sewage Sludge and How to Sell It,
W78-03511 5E

Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

Sludge Disposal To Land 'Good Farming Practice'.
W78-03527 5E

Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

Complete Service for Slurry Recycling.
W78-03553 5E

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

SLUDGE TREATMENT
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

Aeration Tank for Activated Sludge Treatment of Waste Water--Is Smaller and Requires Less Power for a Given Treatment Capacity.
W78-03500 5D

Developments in the Treatment of Effluent,
W78-03506 5D

Sludge Dewatering--A Task the right Equipment Makes Easier.
W78-03510 5D

Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

SLUDGE TREATMENT

Sludge Composting Projects in U.S. Cities,
W78-03525 5E

Irradiating Dried Sludge Could Benefit Environment, Save Energy.
W78-03526 5D

Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

Complete Service for Slurry Recycling.
W78-03553 5E

Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

SLURRIES

Recessed Impeller Pump.
W78-03529 8C

SNAILS

Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

SNAKE RIVER

Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

SNOW COVER

Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

Thermal Regime of Prairie Snowcover,
W78-03460 2C

Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

SNOWMELT

Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

SNOWPACKS

Thermal Regime of Prairie Snowcover,
W78-03460 2C

SOCIAL ASPECTS

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

SOIL AMENDMENTS

Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

SOIL ANALYSIS

Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

SOIL CHEMICAL PROPERTIES

Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

SOIL CONSERVATION

Channel Modification Guidelines.
W78-03350 4A

SOIL CONTAMINATION

Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

SOIL CONTAMINATION EFFECTS

Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

SOIL DISPOSAL FIELDS

Greywater for the Greenhouse,
W78-03534 5D

Soil's Natural Processes Can Clean Wastes from Sewage Water.
W78-03558 5D

Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

SOIL DYNAMICS

One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

SOIL EROSION

Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

SOIL MASS

Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

SOIL MOISTURE

The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

SOIL PHYSICAL PROPERTIES

Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

SOIL SEALANTS

Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

SOIL TREATMENT

Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

SOIL WATER

Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

Retention of Soil Water Following Forest Cutting,
W78-03252 2G

SOIL WATER MOVEMENT

Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

SOIL-WATER-PLANT RELATIONSHIPS

Water Capacity of Mountain-Forest and Meadow Soils of the Northern Caucasus, (In Russian),
W78-03345 2G

SOLAR RADIATION

Irradiance Measurements in the Upper Ocean,
W78-03468 2L

SOLID WASTES

Pollution and Industrial Waste.
W78-03325 5G

Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

SOLIDS CONTACT PROCESSES

Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

SOUTH AFRICA

Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

SOUTH AMERICA

Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

SOUTH CAROLINA

Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

SOUTH DAKOTA

Water Resource Planning and Rural Water Systems,
W78-03371 6E

SOUTHWEST U.S.

Importance, Preservation and Management of Riparian Habitat: A Symposium, Tucson, Arizona, July 9, 1977.
W78-03661 4C

SOUTHWEST US

Water Reuse in the Southwest,
W78-03219 5G

SPECTRA PH-2 PHENOL INSTRUMENT
Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

SPECTROMETER
Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

SPECTROMETERS
Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

SPECTROPHOTOMETRY
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

SPILLWAYS
Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

SPOIL BANKS
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

SPORT FISHING
Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

SPRAY IRRIGATION
Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

SPRINKLER IRRIGATION
Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

STABILIZATION
Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

STANDARDS COMPLIANCE
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

STANDING CROPS
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

STATE GOVERNMENT
North Carolina Coastal Zone Management Act,
W78-03342 2L

STATE GOVERNMENTS
REA Enterprises V. California Coastal Zone Commission (California Coastal Zone Commission Review of Regional Permits).
W78-03384 6E

STATISTICAL METHODS
Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

STEEL
Valves for the Water Industry.
W78-03624 8C

STOCHASTIC PROCESSES
Stochastic Models for Reservoir Design,
W78-03631 4A

Urban Stormwater Management,
W78-03632 5G

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

STORAGE
Routing of Floods in River Channels,
W78-03240 2E

STORAGE TANKS
Concrete Stave Tanks.
W78-03552 8F

Glass Lined Tanks Gain Popularity.
W78-03555 8G

STORM WATER
Urban Stormwater Management,
W78-03632 5G

Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

STRATIFICATION
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

Method for Destratifying Bodies of Water,
W78-03605 5G

STRATIGRAPHY
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

STREAMFLOW
Routing of Floods in River Channels,
W78-03240 2E

Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

STRENGTH OF MATERIALS
Pipework Flexibility,
W78-03495 8G

STRIP MINES
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

STRONTIUM-90
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

STRUCTURAL ANALYSIS
Pipework Flexibility,
W78-03495 8G

STRUCTURAL ENGINEERING
Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

SUBSIDENCE
Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

SUBSOIL
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

SULFIDES
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

SULFITE LIQUORS
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

SURF
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

SURF-BOARDING
Buchanan V. City of Newport Beach (Municipal Responsibility for Surfing Injuries Indirectly Related to Construction of Jetty).
W78-03386 6E

SURFACE DRAINAGE
Mississippi State Highway Commission v. Tyner (Owners of Land Bordering Natural Watercourses May Increase and Accelerate Surface Water Drainage without Liability).
W78-03376 6E

SURFACE IRRIGATION
Management Model for Wastewater Disposal on Land,
W78-03636 5E

SURFACE MIXED LAYER
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

SURGES
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

SURVEILLANCE SYSTEMS
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

SUSPENDED SOLIDS
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

SWAMPS
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

SWEDEN
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

SWITZERLAND
Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

SWMM MODEL
Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

SYNTHETIC RUBBER
Elastomeric Membranes,
W78-03536 8G

SYSTEMATICS
Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

TANNERY WASTES
Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

TAXES
Industrial Effluent Control and Charges,
W78-03217 5G

TENNESSEE
Pleasant View Utility District V. Vradenburg (Recovery for Taking of Flowage Easement Barred by Statute of Limitations).
W78-03389 6E

TERTIARY TREATMENT
Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

Highly Advanced Sewage Treatment (Hochentwickelte Abwasserreinigung).
W78-03514 5D

Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

Lisnaskea Sewage-Treatment Works,
W78-03542 5D

The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

TEXAS
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

Dredging Operations in the Galveston District,
W78-03229 5G

Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

Gleghorn V. City of Wichita Falls (Improper Jury Instructions in Condemnation Suit).
W78-03387 6E

Smith-Southwest Industries V. Friendswood Development Company (Liability of Percolating Water User for Subsidence of Land).
W78-03388 6E

Sabine River Compact.
W78-03402 6E

Marl, Sand, Gravel, Shell and Mudshell.
W78-03403 6E

Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

TEXAS GULF INTRACOASTAL WATERWAY
Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

TEXTILES
Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

Textile Industry Effluents--Instructions for Practical Use (Textil-Abwasser--Wegleitung fuer die Praxis).
W78-03206 5G

New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

Concentrating Wool Contaminants.
W78-03208 5D

Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

Water Conservation in Textile Finishing,
W78-03211 5D

Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

THAILAND
Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

THERMAL BARS
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

THERMAL POLLUTION
Appalachian Power Company V. Train (Review of EPA Regulations Governing Discharge of Heat).
W78-03380 6E

The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

THERMAL REGIME
Thermal Regime of Prairie Snowcover,
W78-03460 2C

TIDAL CHARTS
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

TIDAL MARSHES
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

TIDAL WATERS
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

TIDES
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

TILGHMAN ISLAND
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

TOXIC SUBSTANCES CONTROL ACT
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

TOXICITY
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

Toxicities of Bleaching Effluents Under Finnish Conditions (Toxiciteten hos blekeriavloppsvatten i finska forhallanden),
W78-03305 5C

Difficulty Decomposed Toxic Substances from the Pulp and Paper Industry (Svarnedbrytbara, toxiska amnen fran pappers- och cellulosaindustrin),
W78-03306 5C

Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

TOXICOLOGY
Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

TOXINS
Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

TRACE ELEMENTS
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

TRACE METALS
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

TRACERS
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

TRACKING TECHNIQUES
Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

Tracking Pollutants from a Distance,
W78-03670 5A

TRANSPORT
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

TRANSPORTATION
Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

TRAPPING CAPACITY
A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

TRASH RACKS
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

TREATIES
Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

TREATMENT FACILITIES
Starch Recovery Exceeds 90% with Liquid Cyclone System.
W78-03202 5D

Automatic Water-Treatment Plant.
W78-03213 5D

Pre-Insulated Piping System Used for Water and Tailings at Canada's First Arctic Mine.
W78-03214 8G

Earthworms to Aid Sludge Disposal.
W78-03221 5E

Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

Treatment Facilities Expanded at Denver Sewage District.
W78-03505 5D

Highly Advanced Sewage Treatment (Hochentwickelte Abwasserreinigung).
W78-03514 5D

Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

Sludge Composting Projects in U.S. Cities,
W78-03525 5E

Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

Design and Construction of an Activated Sludge Plant,
W78-03573 5D

TREES
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

TRICKLING FILTERS
A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

TRISODIUM PHOSPHATE
Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

TURBIDITY CURRENTS
Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

TURBINE BLADES
Vertical Axis Aerating Rotor for Waste Water--Can be Operated at Higher Speeds than Previous Inverted Cone Turbine Rotors.
W78-03502 5D

TURBINES
Turbine Standby for Water and Sewage Plants.
W78-03520 8C

U.S. ARMY CORPS OF ENGINEERS
History of the Aquatic Plant Control Program,
W78-03430 5G

UKRAINE
A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

ULTIMATE DISPOSAL
A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

ULTRASONICS
Ultrasonic Sludge Dip Stick.
W78-03561 5A

UNDERGROUND WASTE DISPOSAL
State Underground Injection Control Programs.
W78-03364 5G

UNIT HYDROGRAPHS
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

UNITED NATIONS
The United Nations Environment Program: The Mediterranean Conferences,
W78-03336 6E

United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

UNITED STATES
United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

UNSATURATED FLOW
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

UPPER ROMERIKE DISTRICT (NORWAY)
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

UPWELLING
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

URBAN DRAINAGE
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

URBAN RENEWAL
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

URBAN RUNOFF
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

USE RATES
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

USSR (BRITAJIAN RESERVOIR)
Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

USSR (LAKE TALMI)
Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

USSR (SE TURKMENISTAN)
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

USSR (SIVASH LAKE)
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

USSR (TURKMEN SSR)
Diurnal Zooplankton Migration in Ponds of the Turkmen SSR, (In Russian),
W78-03453 2H

USSR (UKRANIAN SSR)
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

UTAH
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

The Meromictic Great Salt Lake,
W78-03446 2H

UTILITIES
Water Monitor System: Phase I Test Report,
W78-03663 5A

VALVES
Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

Valves for the Water Industry.
W78-03624 8C

VANCOUVER ISLAND
On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

VEGETATION EFFECTS
Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

VEGETATION ESTABLISHMENT
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

Fibre Mats for Landscape Engineering.
W78-03551 8G

VENTURI FLUMES
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

VENTURI METERS
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

VIRICIDES
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

VIRUSES
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

WALES
Welsh Water Re-organization.
W78-03623 5G

WASHINGTON
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

WASTE ASSIMILATIVE CAPACITY
Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

WASTE DISPOSAL
A New Concept for Dredged Material Disposal,
W78-03228 5E

Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

Ultimate Disposal of Oil and Hazardous Materials,
W78-03283 5E

The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

Final Revision of Regulations and Criteria for Ocean Dumping.
W78-03369 5G

Carmel Valley View, Limited v. Board of Supervisors, in and for County of Monterey (Denial of Use of Septic Tanks in Proposed Subdivision).
W78-03393 6E

State Ex Rel. Brown v. Brookside Reclamation, Incorporated (Exhaustion of Administrative Remedies Required Before Institution of Nuisance Action).
W78-03399 6E

Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

WASTE IDENTIFICATION
Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

WASTE TREATMENT
Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

Condensate Purification Process,
W78-03608 5D

Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

WASTE WATER DISPOSAL
Save the Bay, Incorporated v. Mississippi Air and Water Pollution Control Commission (Hearing Requirements for Discharge Permits Under NPDES).
W78-03378 6E

Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

Sludge Disposal To Land 'Good Farming Practice'.
W78-03527 5E

Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

Submarine Pipeline for River Wear.
W78-03554 5E

Sea Outfall for Dorset.
W78-03557 5E

Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

Management Model for Wastewater Disposal on Land,
W78-03636 5E

WASTE WATER (POLLUTION)

Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

WASTE WATER TREATMENT

New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

Anaerobic Processes, (Literature Review),
W78-03218 5D

Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

Inclined Screen for Waste Water Purification (Schraegsieb zur Abwasserreinigung),
W78-03290 5D

Fine Screening at the Inlet--A Way to Reduce Construction and Modernization Costs of Small Clarifier Installations (Feinsiebung im Zulauf--ein Weg zur Senkung von Neubau- und Sanierungskosten kleinerer Klaeranlagen),
W78-03291 5D

Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

State Board Adopts Comprehensive Action Plan (Wastewater Reclamation),
W78-03363 5G

Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

Sewage Channel Bar Screen Rake--Raisable by Chain Along Rearward Swivelling Carrier on Cantilever with Power Cylinder Drive.
W78-03498 5D

Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

Method of Treating Water Containing Chromate,
W78-03592 5D

Dewatering Clay Slurries,
W78-03593 5D

Biological Denitrification of Water,
W78-03604 5D

Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

Water Monitor System: Phase I Test Report,
W78-03663 5A

The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

WATER ALLOCATION (POLICY)

Federal-State Water Rights Conflicts,
W78-03355 6E

Water Resource Planning and Rural Water Systems,
W78-03371 6E

Twin Lake Reservoir and Canal Company v. City of Aspen (Intent and Physical Act Required for Appropriation).
W78-03401 6E

WATER ANALYSES

Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

WATER ANALYSIS

Waste Water Survey of a Partially Sewered City,
W78-03559 5B

Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaensaeure-Reagenz),
W78-03572 5A

Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

WATER BIRDS

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

WATER CHEMISTRY

The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

WATER CIRCULATION

Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

WATER CONSERVATION

WATER CONSERVATION
New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

Water Resource Policy Study.
W78-03352 6E

Water Saved or Water Lost: The Consequences of Individual Conservation Measures in the Appropriation States,
W78-03379 3B

Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

WATER CONSUMPTION
Water Conservation in Textile Finishing,
W78-03211 5D

Swanson V. Marin Municipal Water District (Water Districts Empowered to Regulate Water Use in Emergencies).
W78-03392 6E

Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

WATER CONTRACTS
State Water Plan Storage Act (Kansas).
W78-03405 6E

WATER CONVEYANCE
Variable Speed Pumping for Process and Main Water Boosting with Accurate Control.
W78-03503 8C

WATER COSTS
Ownership and Water System Operation,
W78-03647 6C

WATER DEMAND
Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

WATER DEMANDS
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

WATER DISTRIBUTION (APPLIED)
City of Grand Junction v. Kannah Creek Association (Right to Change Beneficial Use of Appropriated Waters).
W78-03396 6E

WATER DISTRICTS
Swanson V. Marin Municipal Water District (Water Districts Empowered to Regulate Water Use in Emergencies).
W78-03392 6E

WATER HYACINTH
Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

Aquatic Plant Problems in Puerto Rico,
W78-03434 4A

Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

WATER HYACINTHS
Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

WATER INJURY
Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

WATER LEVEL FLUCTUATIONS
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

WATER LEVELS
Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

WATER LOSS
Seepage from Oxidation Ponds,
W78-03472 5B

WATER MANAGEMENT (APPLIED)
Death of the Sweet Waters,
W78-03326 5G

Water Quality Management Planning: The Fate of 208,
W78-03330 5G

Channel Modification Guidelines.
W78-03350 4A

Appropriation of Water for Beneficial Use.
W78-03410 6E

Artesian Wells.
W78-03415 6E

Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

WATER PERMITS
Appropriation of Water for Beneficial Use.
W78-03410 6E

Water Quality Act.
W78-03412 6E

WATER POLICY
State Water Plan (Kansas).
W78-03411 6E

Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

WATER POLLUTION
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

The Coming Water Famine,
W78-03324 3B

Death of the Sweet Waters,
W78-03326 5G

State Ex Rel. Brown v. Brookside Reclamation, Incorporated (Exhaustion of Administrative Remedies Required Before Institution of Nuisance Action).
W78-03399 6E

Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

WATER POLLUTION ABATEMENT
Effluent Limitations Guidelines for Existing Sources and Standards of Performance for New Sources.
W78-03331 5G

WATER POLLUTION CONTROL
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

Ultimate Disposal of Oil and Hazardous Materials,
W78-03283 5E

Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massaochpappersindustrin: Resultat av en enkat),
W78-03315 5G

Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

Economic Analysis of Industrial Incentives for Pollution Control: Implications for Water Quality.
W78-03328 5G

Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

The United Nations Environment Program: The Mediterranean Conferences,
W78-03336 6E

Environmental Problems Onshore,
W78-03338 5G

Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

Existing Remedies for Water Pollution,
W78-03372 5G

Oil Spill Recovery Method and Apparatus,
W78-03600 5G

ORSANCO: An Interstage Agency,
W78-03626 5G

Marine Pollution: A Multi-Faceted, Multi-Agency Detection, Research and Enforcement Program.
W78-03628 5G

A Legal Order for the Oceans, II,
W78-03691 6E

WATER POLLUTION EFFECTS

Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

Sewage Fungus Growth in Rivers Receiving Paper Mill Effluent,
W78-03323 5C

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

WATER POLLUTION SOURCES

Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

Barataria Basin: Biological Characterization,
W78-03289 5C

Non-Point Water Quality Modeling in Wildland Management: A State-of-the-Art Assessment (Volume I-Text).
W78-03417 5B

WATER POLLUTION TREATMENT

The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

Method of Treating Water Containing Chromate,
W78-03592 5D

Biological Denitrification of Water,
W78-03604 5D

Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

WATER PURIFICATION

Water Purification System Utilizing Ultraviolet Radiation,
W78-03598 5F

Reverse Osmosis Membrane,
W78-03606 3A

Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

Condensate Purification Process,
W78-03608 5D

Water Purification Device,
W78-03609 5F

WATER QUALITY

The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

Pollution and Industrial Waste.
W78-03325 5G

Water Resource Policy Study.
W78-03352 6E

Florida Safe Drinking Water Act (Proposed Legislation).
W78-03390 6E

The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

WATER QUALITY ACT

Water Quality Act.
W78-03412 6E

WATER QUALITY CONTROL

A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

Water Quality Management Planning: The Fate of 208,
W78-03330 5G

State Underground Injection Control Programs.
W78-03364 5G

The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

Water Purification System Utilizing Ultraviolet Radiation,
W78-03598 5F

Oil Spill Recovery Method and Apparatus,
W78-03600 5G

Biological Denitrification of Water,
W78-03604 5D

Method for Destratifying Bodies of Water,
W78-03605 5G

Water Purification Device,
W78-03609 5F

Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

Total Phosphorus Model for the Great Lakes,
W78-03643 5B

Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

WATER QUALITY CONTROL

Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

WATER QUALITY MANAGEMENT (APPLIED)
ORSANCO: An Interstage Agency,
W78-03626 5G

WATER QUALITY MANAGEMENT PROJECTS
The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

WATER QUALITY STANDARDS
Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

Florida Safe Drinking Water Act (Proposed Legislation).
W78-03390 6E

Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

Water Monitor System: Phase I Test Report,
W78-03663 5A

WATER RESOURCES
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

WATER RESOURCES DEVELOPMENT
Water Reuse in the Southwest,
W78-03219 5G

Water Resource Planning and Rural Water Systems,
W78-03371 6E

State Water Plan (Kansas).
W78-03411 6E

Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

Development of Water Resources in Appalachia.
W78-03675 6B

United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

WATER RESOURCES RESEARCH (US)
Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

WATER REUSE
Water Conservation in Textile Finishing,
W78-03211 5D

Water Reuse in the Southwest,
W78-03219 5G

New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

Bleach Plant Filtrate Recovery,
W78-03322 5D

State Board Adopts Comprehensive Action Plan (Wastewater Reclamation),
W78-03363 5G

Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

The Rising Cost of Making Deserts Bloom,
W78-03621 4B

International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

WATER RIGHTS
Reserved Water Rights - A Solution is Needed,
W78-03353 6E

Federal-State Water Rights Conflicts,
W78-03355 6E

Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

Water Saved or Water Lost: The Consequences of Individual Conservation Measures in the Appropriation States,
W78-03379 3B

Smith-Southwest Industries V. Friendswood Development Company (Liability of Percolating Water User for Subsidence of Land).
W78-03388 6E

Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

WATER SAMPLING
Water Sampler Device,
W78-03596 7B

WATER-SAVING TECHNOLOGY
Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

WATER SHORTAGE
The Coming Water Famine,
W78-03324 3B

Swanson V. Marin Municipal Water District (Water Districts Empowered to Regulate Water Use in Emergencies).
W78-03392 6E

WATER SOURCES
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

WATER STORAGE
City of Grand Junction v. Kannah Creek Association (Right to Change Beneficial Use of Appropriated Waters).
W78-03396 6E

City of Grand Junction v. Kannah Creek Association (The Scope of Permissible Water Use Acquired by a Condemnation Judgment).
W78-03397 6E

State Water Plan Storage Act (Kansas).
W78-03405 6E

Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

WATER SUPPLY
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

WATER SUPPLY DEVELOPMENT
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

Water Resource Policy Study.
W78-03352 6E

State Water Plan (Kansas).
W78-03411 6E

WATER SUPPLY SYSTEMS
Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

WATER TABLE
Water Table Mapping User's Manual,
W78-03484 7C

WATER TEMPERATURE
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

WATER TRANSFER
The Coming Water Famine,
W78-03324 3B

WATER TREATMENT
Water Clarification by Flotation,
W78-03223 5D

Experimental Boiler Promotes Development of Fuel-Saving Water Treatment Programs.
W78-03294 5G

Method of Treating Water Containing Chromate,
W78-03592 5D

Water Purification System Utilizing Ultraviolet Radiation,
W78-03598 5F

Apparatus for the Electrolysis of Water Which Operates Under Pressure,
W78-03602 5F

Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

Water Purification Device,
W78-03609 5F

Welsh Water Re-organization.
W78-03623 5G

WATER USERS
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

WATER UTILITIES REGULATION
Ownership and Water System Operation,
W78-03647 6C

WATER WELLS
Kansas Groundwater Exploration and Protection Act.
W78-03404 6E

WATERFOWL
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

WATERSHED MANAGEMENT
State Water Plan (Kansas).
W78-03411 6E

Non-Point Water Quality Modeling in Wildland Management: A State-of-the-Art Assessment (Volume I-Text).
W78-03417 5B

WATERSHEDS (BASINS)
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

WAVE ACTION
Buchanan V. City of Newport Beach (Municipal Responsibility for Surfing Injuries Indirectly Related to Construction of Jetty).
W78-03386 6E

WAVE PROFILES
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

WAVES
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

WAVES (WATER)
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

WEATHER MODIFICATION
The Coming Water Famine,
W78-03324 3B

WEATHERING
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

WEATHERING (SOILS)
Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

WELL PERMITS
Kansas Groundwater Exploration and Protection Act.
W78-03404 6E

Artesian Wells.
W78-03415 6E

WELL REGULATIONS
Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

Artesian Wells.
W78-03415 6E

WEST COAST (US)
Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

WEST GERMANY (LAKE CONSTANCE)
Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

WETLAND ECONOMICS
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

WETLANDS
Barataria Basin: Biological Characterization,
W78-03289 5C

Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

Coastal Recreation Resources in an Urbanizing Environment, Symposium, Hyannis, Massachusetts, April 12-14, 1976.
W78-03662 6B

WHITE AMUR
Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

WHITE AMUR MONOSEX FISH
Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

WHITE WATER (PAPER MACHINES)
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

WILDLAND
Non-Point Water Quality Modeling in Wildland Management: A State-of-the-Art Assessment (Volume I-Text).
W78-03417 5B

WILDLIFE
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

WILDLIFE CONSERVATION
Channel Modification Guidelines.
W78-03350 4A

WILDLIFE HABITAT
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

WILDLIFE MANAGEMENT
Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

WINDS
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

WISCONSIN
Lange v. Town of Norway (Municipal Liability for Negligent Flooding).
W78-03375 6E

WOODY PLANTS
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

YAZOO RIVER BASIN (MISS)
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

YELLOWSTONE RIVER BASIN (MONT)
Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

ZETA POTENTIAL
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

ZINC
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

ZONING
Northern St. Johns County Coastal Management Plan,
W78-03349 6F

Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

ZOOPLANKTON
Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

ZOOPLANKTON MIGRATION (DIURNAL)
Diurnal Zooplankton Migration in Ponds of the Turkmen SSR, (In Russian),
W78-03453 2H

AUTHOR INDEX

ABELE, R. W. JR.
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

ABRAHAM, K. F.
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

ADAMS, S. M.
A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

AGARWAL, A.
The Rising Cost of Making Deserts Bloom,
W78-03621 4B

AHMED, S.
Waste Water Survey of a Partially Sewered City,
W78-03559 5B

AHREN, P. A.
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

ALBURGER, J. R.
Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

ALESSIO, G.
Marine Fish Culture and Artificial Reproduction for the Exploitation of Orbetello (GR) Lagoon, (In Italian),
W78-03235 2I

ALFARO, J. F.
Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

ALOY, M.
Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

ANDER, P.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

ANDERSEN, J. C.
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

ANDERSON, D. R.
Biological Denitrification of Water,
W78-03604 5D

ANDERSON, R. L.
Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

AOSHIMA, K.
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

APOLINARSKI, M.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

ASANO, T.
Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

ASHAMALLA, A. F.
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

ASHLEY, C. S.
Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

ASPLUND, O. W.
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

ATTURIO, J. M.
Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

AUER, M. T.
Grand Traverse Bay Limnological Data,
W78-03488 2H

The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

AUSTIN, E. P.
Economics of Waste Disposal--A Contractor's View,
W78-03210 5E

BABCOCK, R. H.
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

BAHR, L. M.
Barataria Basin: Biological Characterization,
W78-03289 5C

BAILEY, D. A.
Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

BAILEY, J. E.
Periodic Operation of an Activated Sludge Process,
W78-03582 5D

BAKER, D. E.
Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

BALHAR, L.
Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

BANNISTER, W. W.
Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

BARANNIK, V. P.
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

BARGER, W. R.
Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

BARKLEY, W.
Water Reuse in the Southwest,
W78-03219 5G

BARR, G. L.
Onshore Impact of Offshore Drilling: The Police Power Alternative,
W78-03358 5G

BARRY, J. R.
2,4-D in Slow-Moving Water,
W78-03442 5B

BASCO, D. R.
Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

BECKER, P. R.
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

BEDIENT, P. B.
Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

BEER, C.
Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

BEESE, F.
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

BEHRHORST, V.
Shore and Beach Management in Louisiana,
W78-03341 2L

BENNETT, E. R.
Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

BENNETT, V. R.
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

BERGHOLZ, W. E. JR.
Water Saved or Water Lost: The Consequences of Individual Conservation Measures in the Appropriation States,
W78-03379 3B

BERGMAN, R. D.
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

BEST, I. W. JR.
Model Testing Aids Suction Chamber Design,
W78-03584 8C

BEYER, A.
Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaen-saeure-Reagenz),
W78-03572 5A

BINGEL, F.
The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

BISHOP, A. B.
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

BJORSETH, A.
Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

BLACK, T. A.
Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

BLANC, F. C.
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

BLOSSER, R. O.
Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

BOATMAN, D. J.
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

BOES, R.
ORSANCO: An Interstage Agency,
W78-03626 5G

BORY, B. H.
Water Purification Device,
W78-03609 5F

BOUNDY, J. A.
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

BOUTIERE, H.
The Lagoon of Bages-Sigean, A Model of a Mediterranean Lagoon, (In French),
W78-03668 2H

BOWEN, L. B.
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

BOWMAN, M. J.
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

BRADY, R. F.
Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

BRANNON, J. M.
Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

BRAR, S. S.
Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

BRESLER, E.
A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

BRILL, E. D. JR.
Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

BROWN, C. D.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

BROWN, D. W.
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

BROWN, P.
Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

BROWN, S. L.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

BROWNING, V. D.
Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

BRUSTKERN, R. L.
The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

BRYCE, R.
Pipework Flexibility,
W78-03495 8G

BRZEK, G.
Limnological Aspect of Water Reservoirs of the Lake Region Between Leczna and Wlodawa. Part I, (In Polish),
W78-03272 2H

Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

BUCHINGHAM, M. J.
Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

BUCKSTEEG, K.
Feasibility Study for a Sewage System in the City of Blantyre in Malawi (Feasibility-Studie fuer das Abwassersystem der Stadt Blantyre in Malawi),
W78-03493 5D

BUELL, J. W.
Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

BURKE, W. H. III
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

BURNHAM, J. C.
Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

CADOTTE, J. E.
Reverse Osmosis Membrane,
W78-03606 3A

CALHOUN, C. C. JR
Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

CALIFANO, F. L.
Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

CAMPER, A. K.
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

CANALE, R. P.
Grand Traverse Bay Limnological Data,
W78-03488 2H

The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

CANNON, R. E.
Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

CARLOZZI, C.
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

CARNAHAN, C. L.
Water Table Mapping User's Manual,
W78-03484 7C

CAROTHERS, J. L.
Field Trip, Goose Creek Reservoir,
W78-03433 4A

CARR, D. E.
Death of the Sweet Waters,
W78-03326 5G

CHAN, F. Y.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

CHANASYK, D. S.
Thermal Regime of Prairie Snowcover,
W78-03460 2C

CHANDLER, R. L.
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

CHANG, B. J.
Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

CHAPLINA, A. M.
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

CHAPRA, S. C.
Total Phosphorus Model for the Great Lakes,
W78-03643 5B

CHARACKLIS, W. G.
Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

CHARUDATTAN, R.
Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

CHARYEV, R.
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

CHATTERJEE, S.
Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

CHERNYKH, Z. I.
Alteration of Environmental Conditions in Cleared Narrow Strips in Spruce Forests of the Tien-Shan, (In Russian),
W78-03301 4C

CHESHEV, L. S.
Alteration of Environmental Conditions in Cleared Narrow Strips in Spruce Forests of the Tien-Shan, (In Russian),
W78-03301 4C

CHIAN, E. S. K.
Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

CHIU, T.
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

CHRISTIE, R. O.
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

CHRISTODOULOU, G.
Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

CINQ-MARS, G. V.
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

CLAASSEN, J. P.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

CLARK, E. D.
New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

CLARK, J. R.
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

CLARK, J. W.
Method for Destratifying Bodies of Water,
W78-03605 5G

CLARK, R. E.
Federal-State Water Rights Conflicts,
W78-03355 6E

CLAY, A. M.
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

CLEMENTS, L. W.
Irrigation Pipe Joint Lock,
W78-03599 3F

CLEONG, S.
The Development of the California and Federal Water Pollution Control Programs,
W78-03367 5G

CLOUGH, F.
Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

COACHMAN, L. K.
Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

COHEN, A. I.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

COHEN, J. M.
Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

CONLAN, A. H.
Emerging Rights for Owners of Subsided Lands (Comment on Coastal Industrial Water Authority v. York),
W78-03332 6E

CONNER, W. H.
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

CONNOR, J. J.
Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

CONRAD, J. R.
Anaerobic Processes, (Literature Review),
W78-03218 5D

CONTRACTOR, D. N.
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

CONWAY, K. E.
Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

COOPER, P. F.
Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

COOPER, R. E.
Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

CORDO, H. A.
Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

COSGROVE, J. H.
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

COUCH, R.
Reconnaissance Survey of Aquatic Weed Infestations in Lakes and Navigable Streams in Oklahoma,
W78-03435 5G

COWLES, C. D. IV.
Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

CRAIG, N. J.
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

CREW, H.
Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

CRITS, G. J.
Condensate Purification Process,
W78-03608 5D

CROCKETT, A. B.
Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

CUNNINGHAM, P. A.
A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

D'ITRI, F. M.
The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

DAILEY, J. E. AND
Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

DALPKE, H. -L.
Loading of Process Water By Dissolved Substance.. During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

DART, M. C.
Industrial Effluent Control and Charges,
W78-03217 5G

DAVIES, W. J.
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

DAVIS, E. M.
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

DAY, J. C.
Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

DE BOUILLE, C.
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

DE GUIDA, R.
Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

DE LA CRUZ, A. A.
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03o59 2L

DEBO, T. N.
The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

DECELL, J. L.
Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

DEGEN, L.
Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

DEHOYOS, D.
The United Nations Environment Program: The Mediterranean Conferences,
W78-03336 6E

DEMPSEY, H.
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

DENISOVA, A. I.
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

DERECKI, J. A.
Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

DETTMAN, E. H.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

DICK, R. I.
Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

DODD, J. D.
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

DORGE, C. L.
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

DORSETT, R. S.
Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

DOTY, W. T.
Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

DREMAILOVA, L. M.
Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

DREW, E. A.
Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

DROBNY, N. L.
Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

DUEDALL, I. W.
Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

DURANCEAU, P. E.
The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

DVORAK, A. J.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

DYBTSYNA, N. F.
Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

EGAN, A.
Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

EISENHARDT, A.
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

ELLINGSON, W.
Water Resource Planning and Rural Water Systems,
W78-03371 6E

ELSTER, H. -J.
Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

ENGLER, R. M.
Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

ENGLISH, J. N.
Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

EPSTEIN, A. C.
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

EPSTEIN, E.
Sludge Composting Projects in U.S. Cities,
W78-03525 5E

ERICKSON, L. E.
Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

ERICKSON, R. L.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

ERIKSSON, K.-E.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

ESSELBORN, H.
New Procedure for Treating Industrial Effluents at the Chemical Complex at Saint-Fons, Lyon (Procede noveau pour le traitement d'effluents industriels du complex chimique de Saint-Fons a Lyon),
W78-03207 5D

EUGSTER, J.
The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

EVANS, J. A.
Environmental Problems Onshore,
W78-03338 5G

EWEL, K. C.
Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

FAN, L. T.
Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

FARRELL, J. B.
A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

FIERING, M. B.
Reservoir Planning and Operation,
W78-03630 4A

FINLEY, R. J.
Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

FINNEMORE, E. J.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

FINNEY, B.
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

FLATT, P. E.
Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

FLOYD, H. M.
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

FOLEY, L. L.
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

FOLSTER, H. G.
Water Reuse in the Southwest,
W78-03219 5G

FONG, R. K. T.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

FONTAINE, T. D. III.
Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

FORD, G.
Oil Pollution Liability Legislation Transmitted to the Congress,
W78-03343 5G

FORSBERG, A.
A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

FRANKEL, R. J.
Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

FREED, D. E.
Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

FREEDMAN, P. L.
Grand Traverse Bay Limnological Data,
W78-03488 2H

The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

FREEMAN, T. E.
Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

FRIEDMAN, B.
Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

FUKUZUMI, T.
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

FULLER, J. D.
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

GAINER, J. L.
Oxygen Diffusion and Fermentations,
W78-03216 5D

GANGSTAD, E. O.
History of the Aquatic Plant Control Program,
W78-03430 5G

GARBER, L. L.
Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

GARRETT, C.
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

GARRETT, W. D.
Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

GAUTAM, S.
Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

GERBA, C. P.
Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

GHOBRIAL, F. H.
Kinetics of Cell Growth and Bacteria Proliferation in Activated Sludge Treatment (A sejtanyag, illetve bakterium-szaporulat kinetikaja az eleveniszapos eljarasban),
W78-03513 5D

GHOSH, S.
Anaerobic Processes, (Literature Review),
W78-03218 5D

GIBSON, M. M.
Indian Claims in the Beds of Oklahoma Watercourses,
W78-03357 6E

GILBERT, T. R.
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

GILL, M. A.
Routing of Floods in River Channels,
W78-03240 2E

GLASGOW, R. M.
Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

GLOYNA, E. F.
Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

GOLDFARB, W.
Water Quality Management Planning: The Fate of 208,
W78-03330 5G

GOLDSTEIN, D. J.
Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

GOTTSCHING, L.
Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

GRANGER, R. J.
Thermal Regime of Prairie Snowcover,
W78-03460 2C

GRAY, D. D.
A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

GREEN, T.
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

GRENNEY, W. J.
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

GRIFFIN, R. E.
Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

GRIMSRUD, G. P.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

GUERRA, L. V.
Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

GUJER, W.
The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

HACHUM, A. Y.
Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

HACKNEY, C. T.
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

HALE, A.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

HALL, M. J.
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

HALMOVA, T.
Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

HAMILTON, D. R.
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

HANDL, G.
Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

HANN, R. W. JR.
Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

HANNAH, S. A.
Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

HANSON, B. C.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

HANYA, T.
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

HAPP, G.
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

HARA, K.
Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

HARDEN, C. W.
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

HARDISKY, M. A.
Salt-Marsh Plant Geratology,
W78-03654 2L

HARRINGTON, P.
Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

HASE, Y.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

HAYAKAWA, N.
Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

HEALEY, A. K.
Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

HEBRARD, J. J.
Barataria Basin: Biological Characterization,
W78-03289 5C

HECKER, S.
North Carolina Coastal Zone Management Act,
W78-03342 2L

HEFFELFINGER, R. E.
Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

HEIDE, E-A.
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

HELLIWELL, P. R.
Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

HELWIG, J. G.
Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

HENRY, V. D.
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

HEYDWEILLER, J. C.
Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

HIGGINSON, R. K.
Reserved Water Rights - A Solution is Needed,
W78-03353 6E

HINCHMAN, R. A.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

HINZ, W.
Fauna and Densities of Molluscs in Some Mountain Waters in the Surroundings of Dombas (South Norway), (In German),
W78-03669 5B

HIROSE, Y.
Observations on the Overwintering Gambusia Affinis (The Mosquito Fish) in Tokushima City, (In Japanese),
W78-03583 5C

HIRSCHBERG, D. J.
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

HOARD, M. G.
Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

HOFREITER, B. T.
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

HOGGAN, D. H.
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

HOLLIDAY, B. W.
Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

HOLLINGS, E. F.
Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

HOLLY, F. M. JR
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

HONGVE, D.
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

HOOVER, T. B.
Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

HORAK, G.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

HORTON, J. H.
Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

HOUSTON, D. G.
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

HOWARD, C. D. D.
Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

HOWARD, R. L.
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

HOWE, L. H.
Trace Analysis of Arsenic by Colorimetry, Atomic Absorption and Polarography,
W78-03665 5A

HOWELL, J.
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

HUANG, S.-Y.
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

HUBBARD, D. W.
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

HUEBNER, P.
Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

HUGHES, G. W.
Rest Area Wastewater Treatment,
W78-03516 5D

HUGHES, T. C.
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

HULTSTRAND, V. S.
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

HUMECKI, H. J.
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

HUNT, P. G.
Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

HUNTOON, P. W.
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

HYDE, R. A.
Water Clarification by Flotation,
W78-03223 5D

HYPES, W. D.
A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

IDELOVITCH, E.
Seepage from Oxidation Ponds,
W78-03472 5B

INMAN, L. B.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

ISHIWATARI, R.
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

JACKSON, J.
Effective National Regulation of Point Sources Under the 1972 Federal Water Pollution Control Act: The Double Burden of Legislative Draftmanship and Judicial Review,
W78-03333 5G

JAIN, R. K.
Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

JALICKEE, J. B.
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

JAMES, W. P.
Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

JANES, G. A.
Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

JANICKE, W.
Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

JAROS, S. E.
Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

JASTROW, J. D.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

JAY, D. A.
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

JEFFERS, E. L.
Water Monitor System: Phase I Test Report,
W78-03663 5A

JELUS, M.
Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

JENKINS, R. G.
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

JENKINS, R. S.
Oil Spill Recovery Method and Apparatus,
W78-03600 5G

JENSEN, R. H.
Judicial Maelstrom in Federal Waters: A Composite Interpretation of the Federal Water Pollution Control Act Amendments of 1972,
W78-03356 5G

JOHNSON, B. H.
Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

JOHNSON, R. W.
Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

JONES, J. L.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

JORDAN, D.
The Town Dilemma (P.C.B.'s in Bloomington, Indiana),
W78-03362 5G

JOSEFSSON, B.
Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

JOWERS, A. B.
Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

JUPP, B. P.
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

KACZYNSKI, V. W.
Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

KADLEC, V.
Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

KAMMEL, R.
Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

KANBAR, S. A.
Waste Water Survey of a Partially Sewered City,
W78-03559 5B

KARDOS, L. T.
Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

KATZMAN, M. T.
Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

KAWANAMI, A.
Method of Treating Water Containing Chromate,
W78-03592 5D

KAZANKIN, A. P.
Water Capacity of Mountain-Forest and Meadow Soils of the Northern Caucasus, (In Russian),
W78-03345 2G

KEHRBERGER, G. J.
A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

KENNEDY, J. F.
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

KESSLER, A. B.
Water Purification Device,
W78-03609 5F

KICKUTH, R.
Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

KINDER, T. H.
Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

KING, H. A.
Method of Supplemental Irrigation for Farming,
W78-03597 3F

KING, K.
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

KING, M. L.
Oxygen Diffusion and Fermentations,
W78-03216 5D

KINNISON, R. R.
Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

KLEI, H. E.
Dissolved Solids in Wastewater,
W78-03567 5B

KNAPP, I. M.
Sewage Sludge and How to Sell It,
W78-03511 5E

KNUDSEN, J.
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

KOCHETKOV, A. I.
Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

KOENIG, A.
Management Model for Wastewater Disposal on Land,
W78-03636 5E

KOLAR, M.-C.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

KOLOGISKI, R. L.
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

KOSARIC, N.
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

KOTORI, M.
Plankton Investigations in Ishikari Bay, Hokkaido, Zooplankton Biomass During the Summer and Autumn of 1975, (In Japanese),
W78-03595 2L

KOUTSANDREAS, J. D.
Tracking Pollutants from a Distance,
W78-03670 5A

KOWALCZYK, C.
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

KOZLOWSKI, T. T.
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

KRINGSTAD, K.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

KROPF, F. W.
Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

KUBENSKII, A. P.
Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

KUKLEV, YU. I.
Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

KULLENBERG, G. E. B.
Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

KUMAR, K. D.
A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

KUNTE, H.
Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

KUO, P. P. K.
Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

KUSHNIKOVA, S. N.
Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

LAAK, R.
Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

LABADIE, J. W.
Urban Stormwater Management,
W78-03632 5G

LACY, W. J.
The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

LALIK, J.
Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

LANDIN, M. C.
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

LANDNER, L.
Difficulty Decomposed Toxic Substances from the Pulp and Paper Industry (Svarnedbrytbara, toxiska amnen fran pappers- och cellulosaindustrin),
W78-03306 5C

Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

LANE, W. B.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

LARSEN, L. H.
Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

LARSSON, T.
Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

LASSITER, M. S. SR.
Dewatering Clay Slurries,
W78-03593 5D

LEACH, J. M.
Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

LEAHY, E. J.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

LEARY, J. F.
Ultimate Disposal of Oil and Hazardous Materials,
W78-03283 5E

LEDUY, A.
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

LEE, C. R.
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

LEIGHTY, D. A.
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

LEITCH, J. A.
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

LEWIS, M.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

LIEBER, H. W.
Possibilities for Treating Wastewaters Generated in Electroplating Shops to Avoid Special Wastes--Metal Recovery in Place of Sludge Disposal. Part III (Moeglichkeiten zur Behandlung galvanischer Abwaesser unter Vermeidung von Sonderabfaellen--Metallrueckgewinnung statt Schlammdeponie. Teil III),
W78-03689 5D

LIN, A.
The Meromictic Great Salt Lake,
W78-03446 2H

LIN, S. D.
Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

LINDSTROM, C.
Greywater for the Greenhouse,
W78-03534 5D

LINSTEDT, K. D.
Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

LIU, D. H.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

LOGAN, T. J.
Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

LONG, J. M.
Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

LORD, B. N.
Rest Area Wastewater Treatment,
W78-03516 5D

LOUCKS, D. P.
Management Model for Wastewater Disposal on Land,
W78-03636 5E

Stochastic Models for Reservoir Design,
W78-03631 4A

LU, L. T.
Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

LUBYANOV, I. P.
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

LUND, E.
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

LUTTGEN, W.
Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

LUZIN, A. V.
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

MACE, G.
Granular Media Filtration Saves Treatment Costs; Helps Meet EPA Standards,
W78-03224 5D

MACHEMEHL, J. L.
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

MACHIDA, Y.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

MACLEOD, W. D.
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

MAHABAL, B. L.
Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

MAHMOOD, T. A.
Waste Water Survey of a Partially Sewered City,
W78-03559 5B

MAJIMA, T.
Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

MALE, D. H.
Thermal Regime of Prairie Snowcover,
W78-03460 2C

MALKASIAN, M. D.
Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

MALLINSON, J. H.
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

MANN, P. C.
Ownership and Water System Operation,
W78-03647 6C

MANN, R.
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

MANOGARAN, C.
Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

MAOTANI, T.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

MARCONI, W.
Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

MARCUSON, W. R. III.
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

MARKELOV, V. N.
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

MARKS, P. J.
Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

MARSALEK, J.
Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

MAS, L.
Apparatus for the Electrolysis of Water Which Operates Under Pressure,
W78-03602 5F

MATHEWSON, C. C.
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

MATSON, M.
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

MATSUMOTO, E.
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

MATSUMOTO, G.
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

MAXWELL, M. J.
Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

MAYSTRENKO, Y. G.
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

MCCALEB, K. E.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

MCCAMMON, C.
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

MCCARTHY, J. M.
Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

MCCARTHY, P. M.
Oil Water Separator,
W78-03619 5G

MCCOLL, J. G.
Retention of Soil Water Following Forest Cutting,
W78-03252 2G

MCCOY, D. S.
Dredging Operations in the Galveston District,
W78-03229 5G

MCFETERS, G. A.
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

MCLOUD, W. R.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

MCMICHAEL, F. C.
Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

MCMILLAN, E. W.
Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

MCTIGHE, G. T.
Oil Water Separator,
W78-03619 5G

MCTIGHE, R. T.
Oil Water Separator,
W78-03619 5G

MECCA, R. M.
Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

MELFI, S. H.
Tracking Pollutants from a Distance,
W78-03670 5A

MELLER, D.
The Fight to Save Hawaii's Shorelines,
W78-03354 2L

MELNICK, J. L.
Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

METRAILER, W. J.
Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

MEYERSON, J. M.
United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

MIKESELL, J. L.
Ownership and Water System Operation,
W78-03647 6C

MILLER, D. G.
Water Clarification by Flotation,
W78-03223 5D

MILLER, H. F.
Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

MILLER, R. D.
A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

MILLER, R. H.
Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

MINAMI, K.
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

MINOR, P. S.
The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

MITCHELL, J. K.
Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

MITSCH, W. J.
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

MOLVAR, A. E.
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

MOLZ, F. J.
Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

MONTGOMERY, R. L.
A New Concept for Dredged Material Disposal,
W78-03228 5E

MOOERS, C. N. K.
Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

MOOIJ, H.
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

MOORE, R. K.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

MORAN, J.
Tracking Pollutants from a Distance,
W78-03670 5A

MORFAUX, J. N.
Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

MORGELI, M.
New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

MORTON, T. G. JR.
The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

MOSS, M. L.
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

MOSS, W. H.
Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

MUBARAK, A.
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

MUELLER, J. C.
Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

MURATA, T.
Condensate Purification Process,
W78-03608 5D

MURAVLEVA, R. E.
Diurnal Zooplankton Migration in Ponds of the Turkmen SSR, (In Russian),
W78-03453 2H

MURDEN, W. R.
The National Dredging Study,
W78-03231 5G

MURZINA, T. A.
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

MYSAK, L. A.
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

NAKAMURA, M.
Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

NAKATO, T.
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

NATHWANI, J. S.
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

NELSEN, T. A.
Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

NELSON, D. W.
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

NELSON, W.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

NESHYBA, S.
Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

NEWBOLD, W. F. JR.
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

NIEBAUER, H. J.
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

NIERING, W. A.
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

NILSSON, C.
River Shore Dynamics, (In Swedish),
W78-03339 4C

NISHIDA, A.
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

NISKIN, S. J.
Water Sampler Device,
W78-03596 7B

NISSEN, B.
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

NNYAMAH, J. U.
Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

NOBLE, E. R.
Elastomeric Membranes,
W78-03536 8G

NORTH, R. M.
Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

NORUM, D. I.
Thermal Regime of Prairie Snowcover,
W78-03460 2C

O'SHAUGHNESSY, J. C.
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

ODDO, N.
Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

OERTEL, G. F.
Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

OHLHORST, C. W.
A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

OLEINIK, A. T.
Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

OLSEN, E. J.
Northern St. Johns County Coastal Management Plan,
W78-03349 6F

OLSEN, R. A.
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

OOSTRA, R.
Water Resource Planning and Rural Water Systems,
W78-03371 6E

ORESHKINA, N. S.
The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

ORITA, N.
Method of Treating Water Containing Chromate,
W78-03592 5D

PACKER, M. L.
Anaerobic Processes, (Literature Review),
W78-03218 5D

PACKHAM, R. F.
Water Clarification by Flotation,
W78-03223 5D

PALERMO, M. R.
A New Concept for Dredged Material Disposal,
W78-03228 5E

PANCHEKHIN, N. P.
Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

PARKER, W. H. III.
State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

PARKHURST, Z.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

PARSONS, T. B.
Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

PASCHKE, M.
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

PATRIE, B. A.
State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

PATTON, R. N.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

PAULSON, C. A.
Irradiance Measurements in the Upper Ocean,
W78-03468 2L

PEARCE, B.
Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

PEDRICK, J. L.
Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

PENNIMAN, J. G.
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

PERDRIEUX, S.
Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

PERNA, A. J.
Dissolved Solids in Wastewater,
W78-03567 5B

PETROS, J. K.
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

PFAENDER, F. K.
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

PHILLIPS, C. R.
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

POLIVANNAYA, M. F.
Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

POWERS, E. L.
Organic Biodegradation in Hypersaline Wastewater,
W78-03220 5C

PREISSMANN, A.
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

PRESCAN, N. L.
Design and Construction of an Activated Sludge Plant,
W78-03573 5D

PRONI, J. R.
Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

PUTSCHER, R. E.
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

QUINN, F. H.
Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

RADWAN, S.
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

RAGOTZKIE, R. A.
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

RAMOS, L. S.
A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

RANNUG, U.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

RAO, A. V.
Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

RAO, M. N.
Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

RAPSON, W. H.
Bleach Plant Filtrate Recovery,
W78-03322 5D

REED, R. J. R.
Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

REEVE, D. W.
Bleach Plant Filtrate Recovery,
W78-03322 5D

REIMOLD, R. J.
Salt-Marsh Plant Geratology,
W78-03654 2L

RENNISON, P. A.
Water Conservation in Textile Finishing,
W78-03211 5D

RICE, R. G.
The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

RICHARDS, W. N.
Water Clarification by Flotation,
W78-03223 5D

RICHARDSON, E. L.
Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

RICHMAN, J.
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

RICHTER, W.
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

RIDEAU, J. P.
Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

ROBERTS, J. C.
Sewage Fungus Growth in Rivers Receiving Paper Mill Effluent,
W78-03323 5C

ROBERTS, P.
The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

ROCKEFELLER, A.
Greywater for the Greenhouse,
W78-03534 5D

ROESLER, J. F.
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

ROESS, A. C.
Anaerobic Processes, (Literature Review),
W78-03218 5D

ROGOVIN, S. P.
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

ROHLICH, A.
Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

ROMAN, M.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

ROMKENS, M. J. M.
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

ROOS, D. V. D. S.
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

ROSBJERG, D.
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

ROSE, J. R.
Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

ROSEN, A. A.
The Foundations of Organic Pollutant Analysis,
W78-03671 5A

ROSS, B. B.
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

ROSS, H. M.
Water Purification System Utilizing Ultraviolet Radiation,
W78-03598 5F

ROTH, C. B.
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

ROWLANDSON, G.
Bleach Plant Filtrate Recovery,
W78-03322 5D

RUSHING, W. N.
Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

RUSSELL, B. S.
Existing Remedies for Water Pollution,
W78-03372 5G

RUSSELL, T. E.
Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

RYCKBORST, H.
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

RYDING, S-O.
A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

SABBATINI, R.
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

SAMUELS, G.
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

SANDERSON, W. I. D.
Lisnaskea Sewage-Treatment Works,
W78-03542 5D

SASTRY, C. A.
Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

SAYLOR, J. H.
Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

SCAIEF, J. F.
Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

SCHICKEDANZ, P. T.
The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

SCHINKE, R.
Fine Screening at the Inlet--A Way to Reduce Construction and Modernization Costs of Small Clarifier Installations (Feinsiebung im Zulauf--ein Weg zur Senkung von Neubau- und Sanierungskosten kleinerer Klaeranlagen),
W78-03291 5D

SCHLAUCH, R. M.
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

SCHMITZ, R. A.
Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

SCHOOLING, H.
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

SCHOTTLER, W.
Fine Screening at the Inlet--A Way to Reduce Construction and Modernization Costs of Small Clarifier Installations (Feinsiebung im Zulauf--ein Weg zur Senkung von Neubau- und Sanierungskosten kleinerer Klaeranlagen),
W78-03291 5D

SCHUBEL, J. R.
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

SCOTT, D. F.
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

SEBESTA, S. J.
Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

SEPPOVAARA, O.
Toxicities of Bleaching Effluents Under Finnish Conditions (Toxiciteten hos blekeriavloppsvatten i finska forhallanden),
W78-03305 5C

SHABI, F. A.
Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

SHANHOLTZ, V. O.
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

SHIMAYA, S.
Condensate Purification Process,
W78-03608 5D

SHIMPS, R. J.
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

SHIPP, R. F.
Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

SHOUVANAVIRAKUL, P.
Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

SHUMAN, M. S.
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

SIDLE, R. C.
Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

SIGVALDASON, O. T.
Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

SIKKA, H. C.
Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

SIMPSON, J. J.
Irradiance Measurements in the Upper Ocean,
W78-03468 2L

SINCIC, D.
Periodic Operation of an Activated Sludge Process,
W78-03582 5D

SINGH, K. P.
Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

SKOWYRSKI, E.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

SLANINA, U.
Inclined Screen for Waste Water Purification (Schraegsieb zur Abwasserreinigung),
W78-03290 5D

SLOSS, P. W.
Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

SMAGIN, V. M.
Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

SMILEY, K. L.
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

SMITH, A. W.
A Legal Order for the Oceans, II,
W78-03691 6E

SMITH, D.
State Board Adopts Comprehensive Action Plan (Wastewater Reclamation),
W78-03363 5G

SMITH, H. K.
Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

SMITH, I.
Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

SMITH, L. S.
Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

SMITH, R. W.
Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

SNOEYINK, V. L.
Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

SODERSTEN, L.
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

SOLOMATOVA, V. P.
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

SOLTANI, G. R.
Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

SPAIN, J. D.
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

SPECTOR, D.
Underwater Thermal Energy Conversion Unit,
W78-03614 8C

SPENCE, D. H. N.
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

SPOHRER, M. L.
Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

SPYROU, N. M.
Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

STAITE, M. J.
Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

STANLEY, J. L.
Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

STEPANOV, V. D.
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

STEPANOVA, R. P.
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

STEPIEN, G. JR.
Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

STEWART, I. M.
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

STINSON II, J. E.
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

STOVER, E. L.
Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

STRIER, M. P.
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

STROTBEK, G.
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

STRUDGEON, G. E.
Upflow-Downflow Carbon Adsorption,
W78-03533 5D

STURGES, D. L.
Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

STURGIS, T. C.
A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

SUGGITT, F. W.
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

SUIDAN, M. T.
Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

SUNDSTORM, D. W.
Dissolved Solids in Wastewater,
W78-03567 5B

SUPROCK, J. F.
Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

SUSSMAN, D. B.
Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

SUZUKI, T.
Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

TAHARA, S.
Condensate Purification Process,
W78-03608 5D

TAHILIANI, C. U.
Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

TAMI, T. M.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

TANAKA, K.
Method for Treating Pulping Effluent, (In Japanese),
W78-03299 5D

TARR, J. A.
Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

TAYLOR, R. D.
Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

TAYLOR, R. E.
Water Monitor System: Phase I Test Report,
W78-03663 5A

THERIEN, N.
Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

THIRUMURTHI, D.
Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

THOMAS, E. V.
Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

THOMAS, J. L.
Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

THOMPSON, C. M.
Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

THRONSON, R. E.
Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

TOMLINSON, R. W.
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

TUBAIL, K.
Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

ULASKA, Z.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

VAN DER PLOEG, R. R.
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

VAN GENUCHTEN, M. T.
Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

VANDERBORGH, N. E.
Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

VANRYZIN, E. M.
Anaerobic Processes, (Literature Review),
W78-03218 5D

VEEDER, W. H.
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

VILLIERS, R. V.
A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

VINOPAL, J. H.
Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

VIRARAGHAVAN, T.
Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

VOGEL, J. C.
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

VOGT, G. B.
Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

VOLOBUEV, V. R.
Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

VOLOVA, G. N.
Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

VORONOV, P. M.
A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

VULLIERMET, B.
Purification Plant for Tannery Effluents--Industrial Application (Station d'epuration sur effluents de tannerie-realisation industrielle),
W78-03215 5D

WAGENER, K.
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

WALD, M.
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

WALDEN, C. C.
Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

WALKER, J. M.
Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

WALKOTTEN, W. J.
Cryogenic Sediment Sampler,
W78-03601 2J

WALLIS, C.
Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

WANG, D-P.
Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

WANG, H.
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

WANG, L. K.
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

WANG, M. H.
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

WANGEN, L. E.
A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

WARD, R. L.
Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

WAUD, A.
Developments in the Treatment of Effluent,
W78-03506 5D

WEAVER, L.
ORSANCO: An Interstage Agency,
W78-03626 5G

WEBB, J. W.
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

WEISSBACH, H.
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

WELLER, M. W.
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

WELLS, P.
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

WERNERT, G. M.
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

WEST, H. W.
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

WEWERKA, E. M.
Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

WHITE, J. R.
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

WHITE, T. M.
Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

WIDELL, L.
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

WIEMHOFF, J. R.
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

WIENKE, C. L.
A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

WILKES, F. G.
First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

WILKINS, G. E.
Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

WILLIAMS, J. M.
Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

WILLIAMS, L. M.
A Guide to Specification of Glass Lined Pipe,
W78-03492 8G

WILLIAMS, T. C.
Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

WILSON, C. G.
Method for Controlling the Growth of Aquatic Plants,
W78-03616 4A

WINKLER, W. J.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

WISE, R. H.
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

WISNER, P. E.
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

WOJCIECHOWSKI, I.
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

WOLVERTON, B. C.
Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

WONG, C. S.
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

WOOD, T. J.
Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

WORK, S. W.
Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

WRIGHT, J.
The Coming Water Famine,
W78-03324 3B

WUNSCH, C.
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

WYATT, K. L.
Oxidation Processes in Activated Sludge at High Dissolved Oxygen Contractions,
W78-03690 5D

YABE, K.
Method of Treating Water Containing Chromate,
W78-03592 5D

YAMASAKI, T.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

YAMATSU, K.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

YANG, W. C.
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

YAO, N-C.
Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

YARMOLINSKII, A. A.
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

YENAKI, G. A.
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

YUNG, D.
Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

ZAJIC, J. E.
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

ZALESHINA, G. M.
Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

ZAPATKA, T. F.
Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

ZEIGER, C. F.
Aquatic Plant Problems in Puerto Rico,
W78-03434 4A

ZHOROV, V. A.
Strontium-90 Concentrations in the Bottom Brine and Sediments of Lake Sivash as Dependent on the Hydrochemical Environment, (In Russian),
W78-03611 5A

ZHUPANENKO, R. P.
Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

ZIEGLER, R. C.
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

ZIELINSKI, J.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

ZOETEMAN, B. C.
International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

ZUELLIG, H.
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

ORGANIZATIONAL INDEX

ABT ASSOCIATES, INC., CAMBRIDGE, MA.
Economic Analysis of Industrial Incentives for Pollution Control: Implications for Water Quality.
W78-03328 5G

ACRES CONSULTING SERVICES LTD., NIAGARA FALLS (ONTARIO).
Models for Scheduling Releases from Multireservoir Systems: A State-Of-The-Art Review,
W78-03637 4A

ADI LTD., FREDERICTION (NEW BRUNSWICK).
Wastewater Treatment Through Soil -- With Special Reference to Septic Tank Effluent Treatment,
W78-03620 5E

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. BIOLOGICAL WASTER MANAGEMENT LAB.; AND AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. SOIL NITROGEN LAB.
Sludge Composting Projects in U.S. Cities,
W78-03525 5E

AGRICULTURAL RESEARCH SERVICE, OXFORD, MS. SEDIMENTATION LAB.
Erodibility of Selected Clay Subsoils in Relation to Physical and Chemical Properties,
W78-03461 2J

AGRICULTURAL RESEARCH SERVICE, PEORIA, IL. NORTHERN REGIONAL RESEARCH LAB.
Paper Mill Effluent Clarified with Immobilized Alpha-Amylase,
W78-03310 5D

AGRICULTURAL RESEARCH SERVICE, STONEVILLE, MS. SOUTHERN WEED SCIENCE LAB.
Recent South American Field Studies of Prospective Biocontrol Agents of Weeds,
W78-03431 5G

AHMADU BELLO UNIV., ZARIA (NIGERIA). DEPT. OF CIVIL ENGINEERING.
Routing of Floods in River Channels,
W78-03240 2E

AKADEMIA ROLNICZA, LUBLIN (POLAND). INST. BIOL. RODSTAW PROD. ZWIERZECEJ.
Limnological Aspect of Water Reservoirs of the Lake Region Between Leczna and Wlodawa. Part I, (In Polish),
W78-03272 2H

AKADEMIA ROLNICZA, LUBLIN (POLAND). ZAKLAD ZOLOGII AND HYDROBIOLOGII. AND AKADEMIA ROLNICZA, LUBLIN (POLAND). ZAKLAD BOTANIKI.
Problems of Hydrobiological Research in the Lake Region Between Leczna and Wlodawa, (In Polish),
W78-03287 2H

AKADEMIYA NAUK AZERBAIDZHANSKOI SSR, BAKU. INST. OF SOIL SCIENCE AND AGROCHEMISTRY.
Content of Hydrated Water in Soils from an Energetic Point of View, (In Russian),
W78-03658 2G

AKADEMIYA NAUK KIRGIZSKOI SSR, FRUNZE. INST. BIOLOGII.
Alteration of Environmental Conditions in Cleared Narrow Strips in Spruce Forests of the Tien-Shan, (In Russian),
W78-03301 4C

AKADEMIYA NAUK SSSR, NOVOSIBIRSK. INST. OF SOIL SCIENCES AND AGROCHEMISTRY.
Some Reasons for Development of Irrigation Erosion, (In Russian),
W78-03329 2J

AKADEMIYA NAUK TURKMENSK I SSR, ASHKHABAD. INST. ZOOLOGII I PARAZITOLOGII.
Diurnal Zooplankton Migration in Ponds of the Turkmen SSR, (In Russian),
W78-03453 2H

AKADEMIYA NAUK URSR, KIEV. INST. HIDROBIOLOGII.
Forest Vegetation as a Source of Biogenic and Organic Substances in Natural Inland Waters,
W78-03265 5B

ALL-UNION RESEARCH INST. OF MARINE FISHERIES AND OCEANOGRAPHY, MOSCOW (USSR).
Water Stratification During Intensive Breeding of Fish in Ponds of the Southeastern Turkmen SSR, (In Russian),
W78-03298 2H

AMERICAN CYANAMID CO., STAMFORD, CT. (ASSIGNEE).
Dewatering Clay Slurries,
W78-03593 5D

AMERICAN GEOPHYSICAL UNION, WASHINGTON, DC.
Research Needs in Erosion and Sedimentation.
W78-03248 2J

AQUASHADE, INC., DOBBS FERRY, NY. (ASSIGNEE).
Method for Controlling the Growth of Aquatic Plants,
W78-03616 4A

ARAGO LAB., BANYUIS-SUR-MER (FRANCE).
The Lagoon of Bages-Sigean, A Model of a Mediterranean Lagoon, (In French),
W78-03668 2H

ARGONNE NATIONAL LAB., IL.
The Environmental Effects of Using Coal for Generating Electricity,
W78-03455 6G

ARIZONA UNIV., TUCSON. SCHOOL OF LAW.
Federal-State Water Rights Conflicts,
W78-03355 6E

ARLABS LTD, BHATGHAR (INDIA).
Recovery and Reuse of Useful Materials from Pollutants of Dyestuff Industry,
W78-03204 5D

ARMY ENGINEER DISTRICT, CHARLESTON, SC.
Field Trip, Goose Creek Reservoir,
W78-03433 4A

ARMY ENGINEER DISTRICT, GALVESTON, TX.
Dredging Operations in the Galveston District,
W78-03229 5G

ARMY ENGINEER DISTRICT, JACKSONVILLE, FL. AQUATIC PLANT CONTROL SECTION.
Aquatic Plant Problems in Puerto Rico,
W78-03434 4A

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS.
Proceedings, Research Planning Conference on the Aquatic Plant Control Program, 22-24 October 1975, Charleston, S.C.
W78-03429 5G

Large-Scale Field Test with the Monosex White Amur in Florida,
W78-03439 5G

Integrated Control of Waterhyacinths with Four Biological Agents,
W78-03441 5G

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS. ENVIRONMENTAL EFFECTS LAB.
A New Concept for Dredged Material Disposal,
W78-03228 5E

Aquatic Disposal of Dredged Material: Release of Contaminants During and After Disposal,
W78-03234 5B

A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species,
W78-03258 2I

Selective Analytical Partitioning of Sediments to Evaluate Potential Mobility of Chemical Constituents During Dredging and Disposal Operations,
W78-03259 5A

Data Evaluations and Recommendations for Comprehensive Planning for the Yazoo River Basin, Mississippi,
W78-03473 4A

Sixth Semiannual Interagency Briefing February 1976, Washington, D.C.,
W78-03477 5G

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS. HYDRAULICS LAB.
Numerical Model Results of Dredged Material Disposal at Ten Proposed Ocean Disposal Sites in the Hawaiian Islands,
W78-03483 5B

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS. MOBILITY AND ENVIRONMENTAL SYSTEMS LAB.
An Automated System for Collecting, Processing, and Displaying Environmental Baseline Data,
W78-03256 7C

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS. SOILS AND PAVEMENT LAB.
One-Dimensional Wave-Propagation Analysis, Newburgh Locks and Dam, Ohio River, Indiana and Kentucky,
W78-03260 8B

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MS. WEAPONS EFFECTS LAB.
Dredged Sediment Movement Tracing in San Francisco Bay Utilizing Neutron Activation,
W78-03257 5B

ARMY ENVIRONMENTAL HYGIENE AGENCY, ABERDEEN PROVING GROUND, MD.

ARMY ENVIRONMENTAL HYGIENE AGENCY, ABERDEEN PROVING GROUND, MD.
Pesticide Recovery Studies for Evaluation of Department of the Army Pesticide Monitoring Program Soil and Sediment Analysis Methodology. Part I. Determination of Pesticide and Polyclorinated Biphenyl Recoveries from Soil Extracted Immediately Following Fortification October-December 1976,
W78-03667 5A

ARMY MEDICAL BIOENGINEERING RESEARCH AND DEVELOPMENT LAB., FORT DETRICK, MD.
Problem Definition Studies on Potential Environmental Pollutants II. Physical, Chemical, Toxicological, and Biological Properties of 16 Substances.
W78-03672 5A

ASIAN INST. OF TECH., BANGKOK, THAILAND.
Water Consumption in Small Communities of Northeast Thailand,
W78-03651 6D

ATLANTIC RICHFIELD COMPANY, ANCHORAGE, AK.
Environmental Regulation of Offshore Exploration, Production, and Development,
W78-03337 5G

AUBURN UNIV., AL. DEPT. OF CIVIL ENGINEERING.
Effect of Vegetation on Landfill Stabilization,
W78-03448 5B

AVTEX FIBERS, INC., FRONT ROYAL, VA.
Waste Recovery: Zinc Recovery From Rayon Plant Sludge,
W78-03295 5D

AZOVSKII NAUCHNO-ISSLEDOVATELSKII INST. RYBNOGO KHOZYAISTVA, ROSTOV-NA-DONU (USSR).
A New Model of Plankton Dredge for Collecting Samples of Water and Planktonic Organisms, (In Russian),
W78-03524 7B

B. C. RESEARCH LTD., VANCOUVER.
Identification and Removal of Toxic Materials from Kraft and Groundwood Pulp Mill Effluent,
W78-03311 5D

BATTELLE COLUMBUS LAB., OH.
Survey of Equipment and Techniques to Identify and Quantify Discharged Hazardous Chemicals,
W78-03266 5A

BAYLOR COLL. OF MEDICINE, HOUSTON, TX. DEPT. OF VIROLOGY AND EPIDEMIOLOGY.
Application of Photodynamic Oxidation to the Disinfection of Tapwater, Seawater, and Sewage Contaminated with Poliovirus,
W78-03548 5D

BEAK CONSULTANTS INC., PORTLAND, OR.
Baseline Study Program, North Puget Sound Biological Oil Impact Literature Review: Vol. II Bibliography,
W78-03698 5B

BLACK AND VEATCH, DENVER, CO.
Making Optimum Use of Filter Media in Wastewater Filtration,
W78-03549 5D

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF MATHEMATICS.
Edge Waves in the Presence of an Irregular Coastline,
W78-03236 2L

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF SOIL SCIENCE.
Rates and Patterns of Water Uptake in a Douglas-Fir Forest,
W78-03250 2G

BUNDESGESUNDHEITSAMT, BERLIN (WEST GERMANY). INST. FUER WASSER-, BODEN-, UND LUFTHYGIENE.
Biological Decomposition of Refractive Compounds After Chemical Oxidation (Biologischer Abbau refraktaerer Verbindung nach chemischer Oxidation),
W78-03544 5D

BUREAU OF INDIAN AFFAIRS, (WASHINGTON, DC.).
Water Rights in the Coal Fields of the Yellowstone River Basin,
W78-03359 6E

BUREAU OF RECLAMATION, DENVER, CO. ENGINEERING AND RESEARCH CENTER.
Design of Arch Dams, Design Manual for Concrete Arch Dams.
W78-03491 8A

BUREAU OF RECLAMATION, WASHINGTON, D.C.
Upper Missouri Region, Fiscal Year 1974.
W78-03360 6E

BUREAU OF SPORT FISHERIES AND WILDLIFE RESEARCH CENTER, JAMESTOWN, ND.
The Phytosociology of the Green Swamp, North Carolina,
W78-03655 2H

BURK AND ASSOCIATES, INC., NEW ORLEANS, LA.
Unique Ecological Features of the Louisiana Coast.
W78-03284 6G

CALIFORNIA UNIV., BERKELEY. DEPT. OF SOILS AND PLANT NUTRITION.
Retention of Soil Water Following Forest Cutting,
W78-03252 2G

CANADA CENTRE FOR INLAND WATERS, BURLINGTON (ONTARIO).
Simulation of Quality of Urban Drainage Effluents,
W78-03641 5B

CARNEGIE-MELLON UNIV., PITTSBURGH, PA. DEPT. OF HISTORY, TECHNOLOGY, AND URBAN AFFAIRS.
Historic Turning Points in Municipal Water Supply and Wastewater Disposal, 1850-1932,
W78-03629 5D

CENTEC CONSULTANTS, INC., RESTON, VA.
The Industry/EPA Confrontation (Living Today with the WPCA Amendments of 1972),
W78-03327 5G

CENTRAL STATE UNIV., WILBERFORCE, OH. DEPT. OF CHEMISTRY.
Evaluation of Instrument for the Determination of Phenol in Water,
W78-03452 5A

CHEMICAL ENGINEERING RESEARCH CONSULTANTS LTD., TORONTO (ONTARIO).
Development of a Soil-Waste Interaction Matrix for Assessing Land Disposal of Industrial Wastes,
W78-03222 5E

CKD DUKLA, PRAGUE (CZECHOSLOVAKIA). (ASSIGNEE).
Ion-Exchange Process for Desalting Water and Subsequent Regeneration of the Ion Exchangers,
W78-03607 3A

CLIVUS MULTRUM INC., CAMBRIDGE, MA.
Greywater for the Greenhouse,
W78-03534 5D

COAST GUARD OFFICE OF RESEARCH AND DEVELOPMENT, GROTON, CT.
Ultimate Disposal of Oil and Hazardous Materials,
W78-03283 5E

COAST GUARD RESEARCH AND DEVELOPMENT CENTER, GROTON, CT.
A Preliminary Test of a Government-Owned Local Area Oil on Water Surveillance System,
W78-03281 5A

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Urban Stormwater Management,
W78-03632 5G

CONNECTICUT UNIV., STORRS. DEPT. OF CIVIL ENGINEERING.
Equilibrium Operation of Subsurface Absorption Systems,
W78-03507 5E

CONNECTICUT UNIV., STORS.
Dissolved Solids in Wastewater,
W78-03567 5B

CONSTRUCTION ENGINEERING RESEARCH LAB. (ARMY), CHAMPAIGN, IL.
Procedures for Reviewing Environmental Impact Assessments and Statements for Construction Projects,
W78-03444 6G

COOK COLL., NEW BRUNSWICK, NJ.
Issues Involved in United States Beach Preservation and Protection Programs,
W78-03348 2L

COOK COLL., NEW BRUNSWICK, NJ. ENVIRONMENTAL LAW.
Water Quality Management Planning: The Fate of 208,
W78-03330 5G

COPENHAGEN UNIV., DENMARK. INST. OF PHYSICAL OCEANOGRAPHY.
Observations of the Mixing in the Baltic Thermo- and Halocline Layers,
W78-03254 5B

CORNELL UNIV. AGRICULTURAL EXPERIMENT STATION, ITHACA, NY. DEPT. OF AGRONOMY.
A Quick Method for Estimating Soil Water Diffusivity Functions,
W78-03253 2G

CORNELL UNIV., ITHACA, NY. DEPT. OF ENVIRONMENTAL ENGINEERING.
Stochastic Models for Reservoir Design,
W78-03631 4A

Management Model for Wastewater Disposal on Land,
W78-03636 5E

CORPS OF ENGINEERS, CINCINNATI, OH.
Development of Water Resources in Appalachia.
W78-03675 6B

CRANE CO., NEW YORK. (ASSIGNEE).
Condensate Purification Process,
W78-03608 5D

CREATIVE BIOLOGY LAB., INC., BARBERTON, OH.
Controlled Release Herbicides - Rubber Formulations,
W78-03438 5G

CROWN ZELLERBACH CORP., SEATTLE, WA.
Model Testing Aids Suction Chamber Design,
W78-03584 8C

DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA). DEPT. OF OCEANOGRAPHY.
The Transfer of Energy and Momentum by the Wind to the Surface Mixed Layer,
W78-03238 2L

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Discrimination of Particulates from Oil in Contaminated Water Utilizing the Angular Intensity Distribution of Scattered Light,
W78-03664 5A

DELAWARE COASTAL ZONE MANAGEMENT PROGRAM, DOVER.
Geographic Areas of Particular Concern.
W78-03273 2L

DELAWARE UNIV., NEWARK.
Activated Sludge Treatment, Generation, and Disposal,
W78-03538 5D

DELAWARE UNIV., NEWARK. COLL. OF MARINE STUDIES.
Sport Fishing in Western Delaware Bay: Assessment of Critical Areas (Research on the Effects of Crude Oil Transfer and Upstream Refineries on Delaware Bay),
W78-03277 5C

DEPARTMENT OF AGRICULTURE, WASHINGTON, DC. OFFICE OF THE SECRETARY. (ASSIGNEE).
Cryogenic Sediment Sampler,
W78-03601 2J

DEPARTMENT OF STATE, WASHINGTON, DC. OFFICE OF AMBASSADORS AT LARGE.
Administration Gives Views on Proposed Legislation on Deep Seabed Mining,
W78-03693 6E

DEPARTMENT OF THE ENVIRONMENT, HULL (QUEBEC). LANDS DIRECTORATE.
Canada Committee on Ecological (Bio-Physical) Land Classification, Working Group on Land/Water Integration, Proceedings of the First Meeting, February 17-18, 1977, Freshwater Institute, Winnipeg, Manitoba.
W78-03653 6G

DEPARTMENT OF THE ENVIRONMENT, VICTORIA (BRITISH COLUMBIA). OCEAN CHEMISTRY DIV.
Heavy Metal Sedimentation in Saanich Inlet Measured with 210PB Technique,
W78-03245 5B

DEPARTMENT OF THE INTERIOR, WASHINGTON, DC. OFFICE OF THE SECRETARY.
Reverse Osmosis Membrane,
W78-03606 3A

DNEPROPETROVSKII GOSUDARSTVENNYI UNIV. (USSR). RESEARCH INST. OF BIOLOGY.
The Accumulation of 90 SR by Freshwater Plants in Bodies of Water of the Steppe Zone of the Ukrainian SSR, (In Russian),
W78-03334 5A

DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, SC. SAVANNAH RIVER LAB.
Trace Elements in the Terrestrial Environment of a Coal-Fired Powerhouse,
W78-03677 5A

DUFRESNE-HENRY ENGINEERING CORP., NORTH SPRINGFIELD, VT.
Award Winning Plant Utilizes Spray Irrigation,
W78-03519 5E

DUNLOP LTD., SKELMERSDALE (ENGLAND). GRG DIV.
Elastomeric Membranes,
W78-03536 8G

EARTHSCAN, LONDON (ENGLAND).
The Rising Cost of Making Deserts Bloom,
W78-03621 4B

EIDGENOESSISCHE ANSTALT FUER WASSERVERSORGUNG, ABWASSERREINIGUNG UND GEWAESSERSCHUTZ, ZURICH (SWITZERLAND).
The Purification of Domestic Waste Water by Means of Activated Carbon After Low Loading Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivkhole nach schwach belasteter biologischer Reinigung und Filtration),
W78-03545 5D

EIDGENOESSISCHE ANSTALT FUER WASSERVERSORGUNG, ABWASSERRINIGUNG UND GEWAESSERSCHUTZ, ZURICH (SWITZERLAND).
Purification of Municipal Waste Water with Activated Carbon After Weakly Loaded Biological Treatment and Filtration (Reinigung von kommunalem Abwasser mittels Aktivokhle nach schwach belasteter biologischer Reinigung und Filtration),
W78-03540 5D

ENGINEERING-SCIENCE, INC., CLEVELAND, OH.
Design and Construction of an Activated Sludge Plant,
W78-03573 5D

ENVIRO CONTROL, INC., ROCKVILLE, MD.
Assessment of Effects of Altered Stream Flow Characteristics on Fish and Wildlife. Vol II - Rocky Mountain Region Case Studies,
W78-03459 5C

ENVIRONMENTAL ENGINEERING CONSULTANTS, INC., STILLWATER, OK.
Laboratory Study of Aeration as a Feasible Technique for Dewatering Fine-Grained Dredged Material.
W78-03480 5E

ENVIRONMENTAL MONITORING AND SUPPORT LAB., LAS VEGAS, NV.

MONITORING SYSTEMS RESEARCH AND DEVELOPMENT DIV.
Mercury Distribution in Soil Around a Large Coal-Fired Power Plant,
W78-03418 5B

ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, IL. OFFICE OF RESEARCH AND DEVELOPMENT.
Wastewater Renovation and Sludge Utilization on Land Including Questions of Ownership,
W78-03535 5E

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OH.
Water Reclamation and Reuse, (Literature Review),
W78-03537 5D

ENVIRONMENTAL PROTECTION AGENCY, LAS VEGAS, NV. OFFICE OF RESEARCH AND DEVELOPMENT.
Tracking Pollutants from a Distance,
W78-03670 5A

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
Petroleum Refining Point Source Category Pretreatment Standards for Existing Sources Effluent Guidelines and Standards.
W78-03346 5G

Textile Industry Point Source Category Effluent Guidelines and Standards.
W78-03347 5G

Water Programs: Secondary Treatment Information (Proposed Rules).
W78-03365 5G

Biochemical Oxygen Demand, Suspended Solids and PH (Secondary Treatment Information).
W78-03366 5G

Final Revision of Regulations and Criteria for Ocean Dumping.
W78-03369 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC.
Pretreatment Standards for Existing Sources and New Sources of Pollution (Proposed Regulations for 21 Industries).
W78-03361 5G

State Underground Injection Control Programs.
W78-03364 5G

Preparation of Environmental Impact Statements for New Source NPDES Permits.
W78-03370 6G

First Annual Report Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material,
W78-03481 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC. OFFICE OF RESEARCH AND DEVELOPMENT.
The Status and Future of Ozone for Water and Wastewater Treatment,
W78-03521 5D

Environmental Research Outlook (FY 1977 Through FY 1981).
W78-03695 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC. OFFICE OF TOXIC SUBSTANCES.
Selected Aspects of the Control of Toxic Substances (A Compilation of Speeches), By the Members of the Staff of the Office of Toxic Substances.
W78-03263 5G

Identification of Selected Federal Activities Directed to Chemicals of Near-Term Concern (Benzene, Bis(Chloromethyl) Ether, Cadmium, Hydrogen Sulfide, Mercury, Platinum, Polynuclear Aromatic Hydrocarbons, Trichloroethylene, Tris (2,3-Dibromopropyl), Phosphate).
W78-03666 5A

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC. OFFICE OF WATER PLANNING AND STANDARDS.
Nonpoint Source Control Guidance Construction Activities,
W78-03268 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC. RESOURCE RECOVERY DIV.
Co-Disposal of Sewage Sludge and Solid Wastes--It Works,
W78-03512 5E

ENVIRONMENTAL RESEARCH LAB., ATHENS, GA.
Evaluation of a Prototype Instrument for Determining Phosphorus in Water,
W78-03264 5A

ERCO ENVIROTECH LTD., LONDON (ONTARIO). (ASSIGNEE).
Bleach Plant Filtrate Recovery,
W78-03322 5D

EXXON RESEARCH AND ENGINEERING CO., LINDEN, NJ. (ASSIGNEE).
Use of Activated Fluid Coke to Remove Organic Contaminants from Waste Waters,
W78-03591 5D

FAR EASTERN UNIV., VLADIVOSTOK (USSR).
Macrozoobenthos of Salt Water Bodies of the South Primor'ye (The Sea of Japan), (In Russian),
W78-03681 2L

FEDERAL COORDINATING COUNCIL FOR SCIENCE, ENGINEERING AND TECHNOLOGY, WASHINGTON, DC. COMMITTEE ON WATER RESOURCES RESEARCH.
Directions in U. S. Water Research: 1978-1982, (Final Draft).
W78-03428 6B

FEDERAL MARITIME COMMISSION, WASHINGTON, DC.
Alaska Pipeline--Financial Responsibility for Oil Spills.
W78-03340 5G

Financial Responsibility for Oil Pollution, Alaska Pipeline.
W78-03351 5G

FINNISH PULP AND PAPER RESEARCH INST., HELSINKI.
Toxicities of Bleaching Effluents Under Finnish Conditions (Toxiciteten hos blekeriavloppsvatten i finska forhallanden),
W78-03305 5C

FLINTKOTE CO., STAMFORD, CT. (ASSIGNEE).
Method for Reducing Water Loss Through Soil by Seepage,
W78-03615 2G

FLORIDA COASTAL ENGINEERS, INC., JACKSONVILLE.
Northern St. Johns County Coastal Management Plan,
W78-03349 6F

FLORIDA UNIV. GAINESVILLE. DEPT. OF FOOD AND RESOURCE ECONOMICS.
Economic Analysis of Water-Saving Techniques in Iran,
W78-03644 3F

FLORIDA UNIV., GAINESVILLE. DEPT. OF PLANT PATHOLOGY.
Aquatic Weed Versus Plant Pathogen, A Study of a Biological Control in Action,
W78-03436 5G

FLORIDA UNIV., GAINESVILLE. SCHOOL OF FOREST RESOURCES AND CONSERVATION; AND FLORIDA UNIV., GAINESVILLE. CENTER FOR WETLANDS.
Possible Effects of the Introduction of the White Amur into Lake Conway, Florida,
W78-03440 5C

FLORIDA UNIV., GAINESVILLE. SCHOOL OF LAW.
Existing Remedies for Water Pollution,
W78-03372 5G

Salt Water Intrusion in Florida (Legal Approaches to Prevention and Control),
W78-03373 5G

The Right of an Individual to Compensation for Damages Done to His Right of Access in Navigable Waters by an Act of the Sovereign,
W78-03374 6E

FOREST SERVICE (USDA), WASHINGTON, DC.
Non-Point Water Quality Modeling in Wildland Management: A State-of-the-Art Assessment (Volume I-Text).
W78-03417 5B

FREIBURG UNIV. (WEST GERMANY). LIMNOLOGISCHES INST.
Lake Constance: Endangerment and Possibilities for Rehabilitation, (In German),
W78-03464 5C

GEORGIA INST. OF TECH., ATLANTA.
Performance Predictions for the Removal of Aqueous Free Chlorine by Packed Beds of Granular Activated Carbon,
W78-03587 5D

GEORGIA UNIV., ATHENS. INST. OF NATURAL RESOURCES.
Financing and Cost Sharing Municipal Water Supply Systems,
W78-03419 6C

GEORGIA UNIV., BRUNSWICK. MARINE EXTENSION SERVICE.
Salt-Marsh Plant Geratology,
W78-03654 2L

GESAMTHOCHSCHULE DUISBURG (WEST GERMANY).
Fauna and Densities of Molluscs in Some Mountain Waters in the Surroundings of Dombas (South Norway), (In German),
W78-03669 5B

GOETTINGEN UNIV. (WEST GERMANY). ABT. OEKOCHEMIE.
Precipitation Products in the FE(II) and Trisodium-Phosphate System at pH 2.5-13.0, (In German),
W78-03454 5F

GOETTINGEN UNIV. (WEST GERMANY). INST. SOIL SCIENCE AND FOREST NUTRITION.
Test of a Soil Water Model Under Field Conditions,
W78-03251 2G

GOTEBORG UNIV. (SWEDEN).
Analysis of Chlorinated Compounds in Bleach Plant Effluents (Analys av klorerade foreningar i blekeriavloppsvatten),
W78-03304 5A

HARVARD UNIV., CAMBRIDGE, MA. DEPT. OF CITY AND REGIONAL PLANNING.
Income and Price Elasticities of Demand for Water in Developing Countries,
W78-03645 6D

HARVARD UNIV., CAMBRIDGE, MA. DEPT. OF ENGINEERING AND APPLIED MATHEMATICS.
Reservoir Planning and Operation,
W78-03630 4A

HENDON (HARRY) AND ASSOCIATES, BIRMINGHAM, AL.
Ball Valves Offer an Alternative for Pump Check Duty,
W78-03518 8C

HOUSE, WASHINGTON, DC.
The Coming Water Famine,
W78-03324 3B

HOUSTON UNIV., TX.
Periodic Operation of an Activated Sludge Process,
W78-03582 5D

HOWARD (CHARLES) AND ASSOCIATES LTD., WINNIPEG (MANITOBA).
Assessment of Environmental Impact on the Aquatic Environment with Limited Data,
W78-03639 5C

HUDSON (ROBERT) (RALETRUX) LTD., LEEDS (ENGLAND).
Developments in the Treatment of Effluent,
W78-03506 5D

HULL UNIV. (ENGLAND). DEPT. OF PLANT PATHOLOGY.
The Silver Flowe. II Features of the Vegetation and Stratigraphy of Brishie Bog, and Their Bearing on Pool Formation,
W78-03699 5C

HUMPHREYS (HOWARD) AND SONS, LEATHERHEAD (ENGLAND).
Advanced Wastewater Treatment Processes at Coleshill,
W78-03539 5D

HYDROCOMP, INC., ATLANTA, GA.
The Complete Drainage Program--More Than an Ordinance,
W78-03650 6E

HYDROSCIENCE, WESTWOOD, NJ.
A Review of Film Flow Modeling as Applied to Trickling Filter Systems,
W78-03586 5D

IDAHO DEPT. OF WATER RESOURCES, BOISE.
Reserved Water Rights - A Solution is Needed,
W78-03353 6E

ILLINOIS INST. OF TECH., CHICAGO. DEPT. OF ENVIRONMENTAL ENGINEERING.
Forested Wetlands for Water Resource Management in Southern Illinois,
W78-03423 2H

ILLINOIS STATE WATER SURVEY, PEORIA. WATER QUALITY SECTION.
Comparison of Membranes for Fecal Coliform Recovery in Chlorinated Effluents,
W78-03581 5A

ILLINOIS STATE WATER SURVEY, URBANA.
The Effect of Irrigation on Precipitation in the Great Plains,
W78-03486 2B

Agricultural Benefit Assessment from Flood Control,
W78-03634 6F

ILLINOIS UNIV. AT URBANA-CHAMPAIGN. DEPT. OF CIVIL ENGINEERING.
Mathematical Methods for Use in Planning Regional Wastewater Treatment Systems,
W78-03420 5G

ILLINOIS UNIV. AT URBANA-CHAMPAIGN. DEPT. OF ENVIRONMENTAL ENGINEERING.
Identification of End Product Resulting from Ozonation and Chlorination of Organic Compounds Commonly Found in Water,
W78-03578 5A

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
On the Smoothing of Oscillations in Finite-Period Unit Hydrographs Derived by the Harmonic Method,
W78-03243 2E

INDIANA UNIV. AT SOUTH BEND. DEPT. OF CHEMISTRY.
Ferric Chloride Treatment Reduces River's Phosphorous Discharge,
W78-03508 5D

INDUSTRIAL ENVIRONMENTAL RESEARCH LAB.-CINCINNATI, CORVALLIS, OR. CORVALLIS FIELD STATION.
Leather Tanning and Finishing Waste Management Research and Development Program,
W78-03225 5D

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, VILLENEUVE D'ASCQ (FRANCE). STATION DE TECHNOLOGIE ALIMENTAIRE.
Study of Polysaccharides in Activated Sludge Mucilage (Etude des polyosides du mucilage des boues activees),
W78-03565 5D

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, IL.
Anaerobic Processes, (Literature Review),
W78-03218 5D

INSTITUTET FOR VATTEN- OCH LUFTVARDSFORSKNING, STOCKHOLM (SWEDEN).
Difficulty Decomposed Toxic Substances from the Pulp and Paper Industry (Svarnedbrytbara, toxiska amnen fran pappers- och cellulosaindustrin),
W78-03306 5C

Effects of Bleach Plant Effluents from Sulfate Pulp Bleaching on Growth and Photosynthesis of Planktonic Algae (Effekter av blekeriavlutar fran sulfatmassablekning pa tillvaxt och fotosyntes av planktiska alger),
W78-03316 5C

INTERNATIONAL REFERENCE CENTRE FOR COMMUNITY WATER SUPPLY, THE HAGUE (NETHERLANDS).
International Cooperation in Studying the Health Aspects of Organic Contaminants in Indirectly Reused Waste Water,
W78-03627 5C

IOWA STATE UNIV., AMES. DEPT. OF ANIMAL ECOLOGY.
Water Birds and Their Wetland Resources in Relation to Oil Development at Storkersen Point, Alaska,
W78-03657 5C

IOWA UNIV., IOWA CITY. INST. OF HYDRAULIC RESEARCH.
Model Study of the Lake Chicot Pumping Plant,
W78-03479 8B

IVL-KONSULT A. B., STOCKHOLM (SWEDEN).
Specific Energy Consumption for Environmental Protection in the (Swedish) Pulp and Paper Industry: Questionnaire Result (Specifik energiforbrukning for miljovard inom massa-ochpappersindustrin: Resultat av en enkat),
W78-03315 5G

JOHNS HOPKINS UNIV., BALTIMORE, MD. CHESAPEAKE BAY INST.
Long Coastal-Trapped Waves Off the West Coast of the United States, Summer 1973,
W78-03237 2L

JORDAN (EDWARD C.) CO., INC., PORTLAND, ME.
State-of-the-Art Treatment of Wastes Generated by the Pulp and Paper Industry,
W78-03303 5D

KANSAS STATE UNIV., MANHATTAN.
Consideration of Suspended Solids Transport in Activated Sludge System Synthesis: I. Simultaneous Use of Clarification and Sludge Thickening Models,
W78-03588 5D

KANSAS UNIV./CENTER FOR RESEARCH, INC., LAWRENCE.
Radar Systems for the Water Resources Mission. Final Report, Volume I,
W78-03682 7B

Radar Systems for the Water Resources Mission. Final Report, Volume II,
W78-03683 7B

Radar Systems for the Water Resources Mission. Final Report, Volume III,
W78-03684 7B

KASPIISKII NAUCHNO-ISSLEDOVATELSKII INST. RYBNOGO KHOZYAISTVA, ASTRAKHAN (USSR).
Zooplankton of the Lower Volga, (In Russian),
W78-03618 5C

KERNFORSCHUNGSANLAGE JUELICH G.M.B.H. (WEST GERMANY).
Matrix of Algae and Method of Making Same and Method of Obtaining Uranium from Sea Water by Said Matrix,
W78-03610 3E

KHARKOV STATE UNIV. (USSR).
Phytoplankton of the Britajian Reservoir (The Northern Donets River), (In Russian),
W78-03603 5C

KIEV STATE UNIV. (USSR).
Feeding of the Perch and Ruff in the Discharge Zone of the Kurakhovo State Regional Electric Power Station, (In Russian),
W78-03622 5C

KIRK, MCCLURE AND MORTON, BELFAST (IRELAND).
Lisnaskea Sewage-Treatment Works,
W78-03542 5D

KOTLASSKII TSELLYULOZNO-BUMAZHNYI KOMBINAT (USSR).
Reagentless Process for Dewatering Activated Sludge (Bezreagentnyi protsess obezvozhivaniya aktivnogo ila),
W78-03319 5E

KURITA WATER INDUSTRIES LTD., OSAKA (JAPAN). (ASSIGNEE).
Method of Treating Water Containing Chromate,
W78-03592 5D

LENINGRAD STATE RESEARCH INST. LAKE RIVER FISH INDUSTRY (USSR).
The Influence of Warm Waters of the Konakovo Hydroelectric Power Station on the Infection Level of Young Roach with Myxosporidians, (In Russian),
W78-03612 5C

LEVER BROS. CO., NEW YORK. (ASSIGNEE).
Water Purification Device,
W78-03609 5F

LEWIS AND CLARK CO., PORTLAND, OR. NORTHWESTERN SCHOOL OF LAW.
Liability, Compensation and Prevention of Oil Spills: A North American Perspective,
W78-03335 5G

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MA.
Pre-Screening for Environmental Hazards--A System for Selecting and Prioritizing Chemicals.
W78-03267 5G

LOCKHEED AIRCRAFT CORP., BURBANK, CA. (ASSIGNEE).
Fluid Separation Device for Low Temperature Environments,
W78-03613 5G

LOS ALAMOS SCIENTIFIC LAB., NM.
A Review of Trace Element Studies Related to Coal Combustion in the Four Corners Area of New Mexico,
W78-03674 5A

Disposal of Coal Preparation Wastes: Environmental Considerations,
W78-03686 5E

LOUISIANA COASTAL COMMISSION, LAYFAYETTE.
Shore and Beach Management in Louisiana,
W78-03341 2L

LOUISIANA COOPERATIVE WILDLIFE RESEARCH UNIT, BATON ROUGE.
Marsh Management for Wildlife: A Bibliography with Abstracts,
W78-03656 2L

LOUISIANA STATE UNIV., BATON ROUGE. CENTER FOR WETLAND RESOURCES.
Impacts of Outer Continental Shelf Activities: Lafourche Parish, LA,
W78-03288 5C

Barataria Basin: Biological Characterization,
W78-03289 5C

LOWELL UNIV., MA. DEPT. OF CHEMISTRY.
Gelation of Oil Slicks by Amine Carbamates as an Adjunct to U.S. Navy Oil Spill Recovery Operations,
W78-03276 5G

MACLAREN (JAMES F.) LTD., WILLOWDALE (ONTARIO). WATER RESOURCES GROUP.
Selection of Models for Urban Drainage Problems: Technical Aspects and Non-Technical Constraints,
W78-03633 4A

MAINZ UNIV. (WEST GERMANY). HYGIENE INST.
Polycyclic Aromatic Hydrocarbons in Agricultural Soil (Polyzyklische, aromatische Kohlenwasserstoffe in landwirtschaftlich genutzten Boden),
W78-03566 5B

MANN (ROY) ASSOCIATES, INC., CAMBRIDGE, MA.
Landscape Concept Development for Confined Dredged Material Sites,
W78-03478 5E

MARCAL PAPER MILLS, INC., ELMWOOD PARK, NJ.
New England Tissue Mill Recycles 73% of its White Water Effluent,
W78-03313 5D

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF CIVIL ENGINEERING.
Application of Estimation Theory to Design of Sampling Programs for Verification of Coastal Dispersion Prediction,
W78-03275 5B

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF EARTH AND PLANETARY SCIENCES.
Tidal Charts of the Indian Ocean North of 15 Deg South,
W78-03469 2L

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. RALPH M. PARSONS LAB. FOR WATER RESOURCES AND HYDRODYNAMICS.
Numerical Modeling of Dispersion in Stratified Waters,
W78-03278 5B

MASSACHUSETTS OFFICE COASTAL ZONE MANAGEMENT, BOSTON. INST. FOR MAN AND ENVIRONMENT.
Ecosystems and Resources of the Massachusetts Coast,
W78-03274 2L

MASSACHUSETTS UNIV., AMHERST. COASTAL RESEARCH CENTER.
Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-72, Plum Island, Massachusetts,
W78-03255 2L

MCCRONE (WALTER C.) ASSOCIATES, INC., CHICAGO, IL.
Asbestos Fibers in Discharges from Selected Mining and Milling Activities. Final Report Part III,
W78-03687 5A

MEDICAL COLL. OF OHIO AT TOLEDO.
Bacterial Control of Aquatic Algal Populations,
W78-03201 5G

MERCK CHEMICAL CO., RAHWAY, NJ.
Oxygen Diffusion and Fermentations,
W78-03216 5D

METHODIST COLL., FAYETTEVILLE, NC. DEPT. OF ECONOMICS.
Inter-State Water Disputes: A Case Study of India,
W78-03646 6E

MICHIGAN STATE UNIV., EAST LANSING. INST. OF WATER RESEARCH.
The Relationship Between the Boron Concentration of East Lansing Municipal Wastewater and Retention Time Through the Michigan State University Water Quality Management Project Under Continuous Flow Conditions,
W78-03680 5A

MICHIGAN TECHNOLOGICAL UNIV., HOUGHTON. DEPT. OF BIOLOGICAL SCIENCES.
The Structure of the Spring Thermal Bar in Lake Superior, II,
W78-03447 2H

MICHIGAN UNIV., ANN ARBOR. SEA GRANT PROGRAM.
The Limnology of Grand Traverse Bay, Lake Michigan,
W78-03487 2H

Grand Traverse Bay Limnological Data,
W78-03488 2H

MICHIGAN UNIV.-FLINT. DEPT. OF BIOLOGY.
Oxygen Consumption in the Prosobranch Snail Viviparus Contectoides (Mollusca: Gastropoda) - II. Effects of Temperature and pH,
W78-03696 5C

MINISTRY OF AGRICULTURE AND FORESTRY, HIROSHIMA (JAPAN). FRUIT TREE RESEARCH STATION.
Evapotranspiration from a Satsuma Mandarin Orchard Determined by Energy Balance Method, (In Japanese),
W78-03262 2D

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE. DEPT. OF ZOOLOGY.
Energy Value, Elemental Composition, and Productivity of Belowground Biomass of a Juncus Tidal Marsh,
W78-03659 2L

MONTANA STATE DEPT. OF HEALTH AND ENVIRONMENTAL SCIENCES, BILLINGS. BUREAU OF WATER QUALITY.
Water-Energy Conflicts in Montana's Yellowstone River Basin,
W78-03649 6E

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CHEMISTRY.
A Laboratory Technique for Appraising in Situ Salinity of Soil,
W78-03462 2G

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CIVIL ENGINEERING AND ENGINEERING MECHANICS.
The Impact of Land Use Change on the Ground Water Resources of the Bozeman, Montana Area,
W78-03427 4B

MONTANA STATE UNIV., BOZEMAN. DEPT. OF MICROBIOLOGY.
Chlorine Injury to Fecal Coliform Bacteria in Treatment Plant Effluents,
W78-03422 5D

MORSZECK (G.) ENGINEERING CONSULTANTS (WEST GERMANY).
Fine Screening at the Inlet--A Way to Reduce Construction and Modernization Costs of Small Clarifier Installations (Feinsiebung im Zulauf--ein Weg zur Senkung von Neubau- und Sanierungskosten kleinerer Klaeranlagen),
W78-03291 5D

MOSCOW STATE UNIV. (USSR). DEPT. OF GENERAL SOIL SCIENCE.
The Dependence of Degree Variation of Soil Moisture on its Value, (In Russian),
W78-03451 2G

MUNICIPAL ENVIRONMENTAL RESEARCH LAB., CINCINNATI, OH.
Removal of Uncommon Trace Metals by Physical and Chemical Treatment Processes,
W78-03546 5D

A Look at Newer Methods for Dewatering Sewage Sludges,
W78-03550 5E

The Foundations of Organic Pollutant Analysis,
W78-03671 5A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, BAY SAINT LOUIS, MS. NATIONAL SPACE TECHNOLOGY LABS.
Waterhyacinths - A Nuisance or a Benefit,
W78-03443 5G

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HOUSTON, TX. LYNDON E. JOHNSON SPACE CENTER.
Water Monitor System: Phase I Test Report,
W78-03663 5A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LANGLEY STATION, VA. LANGLEY RESEARCH CENTER.
A Summary of the Test Procedures and Operational Details of a Delaware River and an Ocean Dumping Pollution Monitoring Experiment Conducted August 28, 1975,
W78-03280 5A

Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
W78-03564 5B

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, CO.
On the Stability of the California Undercurrent Off Vancouver Island,
W78-03465 2L

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., NEW YORK.
Environmental Protection Energy Use in the (U.S.) Pulp and Paper Industry,
W78-03318 5G

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INST. (INDIA). ZONAL LAB.
Studies on Separation of Algae from Stabilization Pond Effluents by Coagulation,
W78-03504 5D

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, DC.
Winter Snow-Cover Maps of North America and Eurasia from Satellite Records, 1966-1976,
W78-03482 7C

NATIONAL FIELD INVESTIGATIONS CENTER-DENVER, CO.
Effluent Limitations Guidelines for Existing Sources and Standards of Performance for New Sources.
W78-03331 5G

NATIONAL INST. FOR OCUPATIONAL SAFETY AND HEALTH, ROCKVILLE, MD.
Registry of Toxic Effects of Chemical Substances, 1976 Edition.
W78-03679 5A

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MI. GREAT LAKES ENVIRONMENTAL RESEARCH LAB.
Total Phosphorus Model for the Great Lakes,
W78-03643 5B

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, CO. ENVIRONMENTAL RESEARCH LABS.
Lake Ontario Beginning-of-Month Water Levels and Monthly Rates of Change of Storage,
W78-03474 2H

Large-Scale Current Measurements in Lake Superior,
W78-03490 2H

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, CO. MARINE ECOSYSTEMS ANALYSIS PROGRAM OFFICE.
A Test Particle Dispersion Study in Massachusetts Bay.
W78-03270 5B

A Pilot Study on the Design of a Petroleum Hydrocarbon Baseline Investigation for Northern Puget Sound and Strait of Juan De Fuca,
W78-03271 5B

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, DC. CENTER FOR EXPERIMENT DESIGN AND DATA ANALYSIS.
Objective Analysis and Classification of Oceanographic Data,
W78-03470 2L

NATIONAL PHYSICAL RESEARCH LAB., PRETORIA (SOUTH AFRICA).
Deuterium in Hailstones Collected on 29 November 1972,
W78-03246 2B

NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD, UPPSALA (SWEDEN). ALGAL ASSAY LAB.
A Mercury-Free Accelerated Method for Determining the Chemical Oxygen Demand of Large Numbers of Water Samples by Autoclaving them Under Pressure with Acid-Dichromate,
W78-03577 5A

NATIONAL TAIWAN UNIV., TAIPEI. DEPT. OF CHEMICAL ENGINEERING.
The Application of Reverse Osmosis to the Primary Treatment of Pulp Spent Liquor,
W78-03300 5D

NATIONAL TRAINING AND OPERATIONAL TECHNOLOGY CENTER, CINCINNATI, OH.
Chemical Analyses for Water Pollutants: Training Manual.
W78-03261 5A

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CA.
Kinematics of Breaking Waves in the Surf Zone: Emphasizing Analysis of Identified and Classified Breakers,
W78-03279 8B

NAVAL RESEARCH LAB, WASHINGTON, DC.
Marking the Sea Surface with Artificial Sea Slicks and Fluorescent Dyes to Aid Search and Rescue or Ocean Dumping Surveillance Operations,
W78-03282 5A

NEVADA UNIV., RENO. DESERT RESEARCH INST.
Water Table Mapping User's Manual,
W78-03484 7C

NEW ENGLAND AQUARIUM, BOSTON, MA.
Influence of the Sediment/Water Interface on the Aquatic Chemistry of Heavy Metals,
W78-03678 5B

NEW MEXICO STATE UNIV., UNIVERSITY PARK.
Water Reuse in the Southwest,
W78-03219 5G

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, ALBANY.
Tests for Nitrifying and Denitrifying Ability of Activated Sludge,
W78-03568 5D

NEW YORK UNIV., NY. GRADUATE SCHOOL OF PUBLIC ADMINISTRATION.
The Urban Waterfront: Opportunities for Renewal,
W78-03344 2L

NGK INSULATORS, LTD., NAGOYA (JAPAN). (ASSIGNEE).
Pyrolysis Process for Treating Sewage Sludge Containing Chromium,
W78-03594 5D

NORTH CAROLINA STATE DEPT. OF ADMINISTRATION, RALEIGH. OFFICE OF MARINE AFFAIRS.
North Carolina Coastal Zone Management Act,
W78-03342 2L

NORTH CAROLINA STATE UNIV. AT RALEIGH. DEPT. OF CIVIL ENGINEERING.
Dredge Material Containment in Nylon Bags in the Construction of Mini-Projects for Beach Stabilization,
W78-03230 5G

NORTH CAROLINA UNIV. AT CHAPEL HILL. DEPT. OF ENVIRONMENTAL ENGINEERING.
Monitoring Heavy Metals and Pesticides in the Cape Fear River Basin of North Carolina,
W78-03426 5A

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF AGRICULTURAL ECONOMICS.
A Selected Annotated Bibliography of Economic Values of Fish and Wildlife and Their Habitats,
W78-03660 6B

NORTHEASTERN UNIV., BOSTON, MA. DEPT. OF CIVIL ENGINEERING.
Pollution Monitoring with Total Organic Carbon Analysis,
W78-03574 5A

NOVA SCOTIA TECHNICAL COLL., HALIFAX. DEPT. OF CIVIL ENGINEERING.
Study Disclaims Contact Stabilization Superiority Over Single Tank Aeration,
W78-03509 5D

OAK RIDGE NATIONAL LAB., TN.
Assessment of Water Resources for Nuclear Energy Centers,
W78-03673 3E

A Critical Evaluation of the Nonradiological Environmental Technical Specifications - Vol. 2: Surry Power Plant Units 1 and 2,
W78-03697 5C

OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, D. C. CONSTRUCTION OPERATIONS DIV.
History of the Aquatic Plant Control Program,
W78-03430 5G

OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, DC.
The National Dredging Study,
W78-03231 5G

OHIO RIVER VALLEY SANITATION COMMISSION, CINCINNATI.
ORSANCO: An Interstage Agency,
W78-03626 5G

OHIO STATE UNIV., COLUMBUS. DEPT. OF AGRONOMY.
Effect of Spray Irrigation of Municipal Wastewater on Nitrogen Transpormations in Soil,
W78-03424 5E

ORAL ROBERTS UNIV., TULSA. DEPT. OF NATURAL SCIENCE.
Reconnaissance Survey of Aquatic Weed Infestations in Lakes and Navigable Streams in Oklahoma,
W78-03435 5G

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Irradiance Measurements in the Upper Ocean,
W78-03468 2L

Rotary Cross-Bispectra and Energy Transfer Functions Between Non-Gaussian Vector Processes. II. Winds and Currents Off the Oregon Coast,
W78-03688 2L

OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
The Ionic Composition of Lakes Fed by Ground Water and Precipitation in the Upper Romerike District,
W78-03471 2H

PARMA UNIV. (ITALY). IST. DI ZOOLOGIA.
Marine Fish Culture and Artificial Reproduction for the Exploitation of Orbetello (GR) Lagoon, (In Italian),
W78-03235 2I

PEN KEM INC., CROTON-ON-HUDSON, NY.
Role Played by Zeta Potential in Effluent Treatment and its Control,
W78-03314 5D

PENNSYLVANIA AGRICULTURAL EXPERIMENTAL STATION, UNIVERSITY PARK.
Chemical Monitoring of Sewage Sludge in Pennsylvania,
W78-03579 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. INST. FOR RESEARCH ON LAND AND WATER RESOURCES.
Heavy Metals Transport Model in a Sludge-Treated Soil,
W78-03590 5B

PERMUTIT CO., PRINCETON, NJ.
Treatment of Metal Finishing Wastes by Sulfide Precipitation,
W78-03226 5D

PETRO CANADA ENGINEERING LTD., CALGARY (ALBERTA). DEPT. OF TRANSPORTATIONS AND OPERATIONS.
Feasibility of Electromagnetic Streamflow Measurements Using the Earth's Field,
W78-03242 2E

RADIAN CORP., AUSTIN, TX.
Industrial Process Profiles for Environmental Use: Chapter 5. Basic Petrochemicals Industry,
W78-03457 5D

RAYTHEON CO., PORTSMOUTH, RI.
How Reliable is Instrumentation in Wastewater Applications,
W78-03563 5A

RESEARCH ASSOCIATION FOR THE PAPER AND BOARD, PRINTING AND PACKAGING INDUSTRIES, SURREY (ENGLAND).
Sewage Fungus Growth in Rivers Receiving Paper Mill Effluent,
W78-03323 5C

RICE UNIV., HOUSTON, TX.
Water Quality Aspects of Agricultural and Urban Drainage,
W78-03638 5G

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENTATION STATION, COLLINS, CO.
Snow Accumulation and Melt in Sprayed and Undisturbed Big Sagebrush Vegetation,
W78-03320 4C

ROYAL VETERINARY AND AGRICULTURE COLL., COPENHAGEN (DENMARK). DEPT. OF VIROLOGY AND IMMUNOLOGY.
The Effect of Sludge Digestion on Virus Infectivity,
W78-03517 5C

SAINT ANDREWS UNIV. (SCOTLAND). DEPT. OF BOTANY.
Limitations of Macrophytes in a Eutrophic Lake, Loch Leven. II. Wave Action, Sediments, and Waterfowl Grazing,
W78-03700 5C

SANDIA LAB., ALBUQUERQUE, NM.
Inactivation of Enteric Viruses in Wastewater Sludge Through Dewatering by Evaporation,
W78-03576 5D

SASKATCHEWAN UNIV., SASKATOON. DIV. OF HYDROLOGY.
Thermal Regime of Prairie Snowcover,
W78-03460 2C

SCHADE (WILLARD F.) AND ASSOCIATES, INC., CLEVELAND, OH.
Comparison of Bench, Pilot, and Full Scale Carbon Adsorption/Filtration,
W78-03532 5D

SELECT COMMITTEE ON NATURAL RESOURCES (U.S. HOUSE), WASHINGTON DC.
United States Discusses its Preparations for the United Nations Water Conference,
W78-03694 6E

SENATE, WASHINGTON, DC.
Hollings Calls for Department of Environment and Oceans,
W78-03692 6E

SHANNON-GLOW INC., LOS ANGELES, CA.
Leak Testing with Dyed Liquid Tracers,
W78-03580 5B

SHELL OIL CO., HOUSTON, TX. CORPORATE LAW DEPT.
Environmental Problems Onshore,
W78-03338 5G

SHERBROOKE UNIV. (QUEBEC). DEPT. OF CHEMICAL ENGINEERING.
Near Optimal Effluent Control for an Existing Activated Sludge Waste Water Treatment Process,
W78-03585 5D

SKIDAWAY INST. OF OCEANOGRAPHY, SAVANNAH, GA.
Hydrologic and Sedimentologic Study of the Offshore Dredge Disposal Area, Savannah, Georgia,
W78-03233 5E

SNAM PROGETTI S.P.A., MILAN (ITALY). (ASSIGNEE).
Method for Conditioning Fresh and Sea Waters from Oil,
W78-03617 5G

SOCIETE DE RECHERCHES TECHNIQUES ET INDUSTRIELLES, (FRANCE). (ASSIGNEE).
Apparatus for the Electrolysis of Water Which Operates Under Pressure,
W78-03602 5F

SOCIETE GRENOBLOISE D'ETUDE ET D'APPLICATIONS HYDRAULIQUES (FRANCE).
Accurate Calculation of Transport in Two Dimensions,
W78-03463 5B

SOIL CONSERVATION SERVICE, WASHINGTON, DC.
Channel Modification Guidelines.
W78-03350 4A

SOUTH CAROLINA UNIV., COLUMBIA. DEPT. OF GEOLOGY.
Hydraulics and Dynamics of North Inlet, South Carolina, 1974-75,
W78-03489 2L

SOUTHAMPTON UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.
Load Balancing at Sewage-Treatment Works: The Southampton University Pilot Plant at Millbrook,
W78-03543 5D

STADT DUSSELDORF (WEST GERMANY). CHEMISCH-BIOLOGISCHE LAB.
Photometric Determination of Total Phosphate with Hydrazine-Molybdic Acid Reagent (Photometrische Bestimmung des Gesamtphosphats mit Hydrazin-Molydaen-saeure-Reagenz),
W78-03572 5A

STANFORD RESEARCH INST. MENLO PARK, CA.
Research Program on Hazard Priority Ranking of Manufactured Chemicals, Phase II - Final Report (Appendix, Listing of References),
W78-03456 5A

STATE UNIV. OF NEW YORK AT STONY BROOK. MARINE SCIENCES RESEARCH CENTER.
PB210-Determined Sedimentation Rate, and Accumulation of Metals in Sediments at a Station in Chesapeake Bay,
W78-03247 5B

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF CHEMICAL ENGINEERING.
Enzymatic Treatment of Primary Municipal Sludge with Trichoderma Viride Cellulase,
W78-03292 5E

STATE UNIV. OF NEW YORK, STONY BROOK. MARINE SCIENCES RESEARCH CENTER.
The Physical Oceanography and Water Quality of New York Harbor and Western Long Island Sound,
W78-03286 5B

STEVENS INST. OF TECH., HOBOKEN, N.J. DEPT. OF MECHANICAL ENGINEERING.
Quarternary Ammonium Thickening of Sewage Sludge in Magnetic Field,
W78-03547 5D

STUTTGART UNIV. (WEST GERMANY). INST. FUER SIEDLUNGSWASSERBAU, WASSERGUETEWIRSCHAFT UND ABFALLWIRTSCHAFT.
The Compatibility of Oxygenation Capacity Measurements (Vergleichbarkeit von Sauerstoffeintragsmessungen),
W78-03570 5D

SULZER FRERES S. A., WINTERTHUR (SWITZERLAND).
New Reflections on Closed Cycles in the Paper and Board Industry (Reflections nouvelles sur les cycles fermes dans l'industrie du papier et du carton),
W78-03307 5D

SURREY UNIV., LONDON (ENGLAND). DEPT. OF PHYSICS.
Determination of Heavy Metals in Sewage-Based Fertilizer Using Short-Lived Isotopes,
W78-03571 5A

SVETOGORSKII KOMBINAT (USSR).
Treatment and Combustion of Effluent Sediment at the Svetogorsk Mill (Opyt obrabotki i szhiganiya osadkov stochnykh vod na Svetogorskom Kombinate),
W78-03293 5D

SWEDISH FOREST PRODUCTS RESEARCH LAB., STOCKHOLM.
Studies on the Mutagenic Properties of Bleaching Effluents,
W78-03317 5C

SYRACUSE UNIV. RESEARCH CORP., NY.
Extensive Degradation of Silvex by Synergistic Action of Aquatic Microorganisms,
W78-03437 5B

SYSTEMS CONTROL, INC., PALO ALTO, CA.
User Handbook for the Allocation of Compliance Monitoring Resources,
W78-03458 5G

TAHAL WATER PLANNING FOR ISRAEL LTD., TEL AVIV. DEPT. OF SEWAGE RECLAMATION.
Seepage from Oxidation Ponds,
W78-03472 5B

TECHNICAL UNIV. OF DENMARK, COPENHAGEN. INST. OF HYDRODYNAMICS AND HYDRAULIC ENGINEERING.
Optimal Scheduling of Water Supply Projects,
W78-03241 4A

TECHNICAL UNIV. OF WARSAW (POLAND). INST. ZAOPATRZENIA W WODE I BUDOWNICTWA WODNEGO.
Two-Stage Pulp Mill Effluent Treatment: Chemical with Lime and Biological by the Activated Sludge Method (Oczyszczanie sciekow celulozowych w ukladzie dwustopniowym: chemicznym - za pomoca wapna i biologicznym - metoda osadu czynnego),
W78-03312 5D

TECHNISCH WERKE DER STADT STUTTGART A.G. (WEST GERMANY).
Sludge Incineration in a Paper Mill Using Natural Gas as Supporting Fuel (Schlammverbrennung mit Erdgas als Stutzfeuer in einer Papierfabrik),
W78-03297 5E

TECHNISCHE UNIV., BRUNSWICK (WEST GERMANY). LEICHTWEISS INST. FOR WATER RESEARCH.
Modeling of Oil Evaporation in Aqueous Environment,
W78-03244 2D

TECHNISCHE UNIV., DARMSTADT (WEST GERMANY). INST. FUER PAPERFABRIKATION.
Loading of Process Water By Dissolved Substances During Paper Manufacture. I. Survey of Stone Groundwood Production (Ueber die durch geloeste Substanzen verursachte Belastung des Fabrikationswassers bei der Papierherstellung. I. Bestandsaufnahme bei der Erzeugung von Steinschliff),
W78-03296 5B

TEEPAK, INC., DANVILLE, IL.
Inequities for Small Food Processing Plants Resulting from Liquid Waste Treatment Regulations,
W78-03648 5G

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA. DIV. OF ENVIRONMENTAL PLANNING.
Trace Analysis of Arsenic by Colorimetry, Atomic Absorption and Polarography,
W78-03665 5A

TEXAS A AND M UNIV., COLLEGE STATION. COASTAL, HYDRAULIC AND OCEAN ENGINEERING GROUP.
Use of Remote Sensing in Evaluating Turbidity Plumes,
W78-03232 2L

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF CIVIL ENGINEERING.
Evaluation of Safety Factors with Respect to Ocean Disposal of Waste Materials,
W78-03269 5C

Shoaling Characteristics of the Gulf Intracoastal Waterway in Texas,
W78-03485 2L

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF GEOLOGY.
Physical Factors Affecting Dredged Material Islands in a Shallow Water Environment,
W78-03227 5E

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF RANGE SCIENCE.
Vegetation Establishment and Shoreline Stabilization: Galveston Bay, Texas,
W78-03475 2L

TEXAS PARKS AND WILDLIFE DEPT., SAN ANTONIO. STATEWIDE NOXIOUS VEGETATION CONTROL PROGRAM.
Aquatic Weed Problems in Mexico and Texas and Some of the Measures for Their Control,
W78-03432 5G

TEXAS UNIV. AT AUSTIN. DEPT. OF CIVIL ENGINEERING.
Wastewater Effluent Discharge to Cooling Lakes,
W78-03575 5E

Establishing the Basis for a Wastewater Treatment Plant Design,
W78-03589 5D

TOKYO METROPOLITAN UNIV. (JAPAN). DEPT. OF CHEMISTRY.
Gas Chromatographic-Mass Spectrometric Identification of Phenols and Aromatic Acids in River Waters,
W78-03560 5A

TOKYO UNIV. (JAPAN).
Decolorization of Kraft Waste Liquor with White-Rot Fungi. I. Screening of the Fungi and Culturing Condition for Decolorization of Kraft Waste Liquor,
W78-03302 5D

TOKYO UNIV. (JAPAN). DEPT. OF PARASITOLOGY.
Observations on the Overwintering Gambusia Affinis (The Mosquito Fish) in Tokushima City, (In Japanese),
W78-03583 5C

TOOTAL FABRIC DIV. RESEARCH, CHESHIRE (ENGLAND).
Water Conservation in Textile Finishing,
W78-03211 5D

TRANSPORTATION RESEARCH BOARD, WASHINGTON, DC.
Photogrammetry, Water Quality, Safety Appurtenances, and Shoulder Design.
W78-03676 5A

UMEA UNIV. (SWEDEN). DEPT. OF ECOLOGICAL BOTANY.
River Shore Dynamics, (In Swedish),
W78-03339 4C

UNIVERSITY OF SOUTHWESTER LOUISIANA, LAFAYETTE. DEPT. OF PLANT INDUSTRY.
2,4-D in Slow-Moving Water,
W78-03442 5B

UNIVERSITY OF WESTERN ONTARIO, LONDON.
Correction Factor for Anthrone Carbohydrate in Colored Waste Water Samples,
W78-03321 5A

UTAH CENTER FOR WATER RESOURCES RESEARCH, LOGAN.
A Study of Feasibility of State Water User Fees for Financing Water Development,
W78-03425 6C

UTAH STATE UNIV., LOGAN.
Micro-Climate Control of Deciduous Fruit Production with Overhead Sprinklers,
W78-03635 3F

UTAH STATE UNIV., LOGAN. DEPT. OF AGRICULTURE AND IRRIGATION ENGINEERING.
Water Infiltration and Runoff Under Rain Applications,
W78-03249 2G

UTAH STATE UNIV., LOGAN. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
The Meromictic Great Salt Lake,
W78-03446 2H

UTAH WATER RESEARCH LAB., LOGAN.
Mixed Integer Programming Models for Water Resources Management,
W78-03421 5G

V. J. T. INST., BOMBAY (INDIA). DEPT. OF PUBLIC HEALTH ENGINEERING.
Recovery and Reuse of Materials from Dyestuff Industry,
W78-03205 5D

VIRGINIA COMMONWEALTH UNIV., RICHMOND. SCHOOL OF DENTISTRY.
Serological Typing and Chlorination Resistance of Wastewater Cyanophages,
W78-03562 5A

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF AGRICULTURAL ENGINEERING.
Finite Element Simulation of Overland and Channel Flow,
W78-03449 2E

VYSKUMNY USTAV PAPIERU A CELULOZY, BRATISLAVA (CZECHOSLOVAKIA).
Study of Dissolved Oxygen Level in Pulp Mill Effluents (Sledovanie kyslikoveho rezimu v odpadovych vodach z vyroby buniciny),
W78-03308 5D

Composition of Spruce Sulfate Pulp Bleaching Effluents (Zlozenie odpadovych vod z bielenia smrekovej sulfatovej buniciny),
W78-03309 5A

WASHINGTON STATE UNIV., PULLMAN.
Centrifugal Dewatering of Municipal and Industrial Sludge,
W78-03515 5E

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF ANTHROPOLOGY.
Slack Water Sediments in the Alpowa Creek Drainage, Washington,
W78-03476 2J

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Dispersion of a Passive Contaminant in Oscillatory Fluid Flows,
W78-03466 5B

Observation of a Bathymetrically Trapped Current Ring,
W78-03467 2L

WATER POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).
Water Clarification by Flotation,
W78-03223 5D

Recent Advances in Sewage Effluent Denitrification: Part I,
W78-03541 5D

WATER PURIFICATION ASSOCIATES, CAMBRIDGE, MA.
Water Conservation and Pollution Control in Coal Conversion Processes,
W78-03685 5G

WATER RESOURCES COUNCIL, WASHINGTON, DC.
Water Resource Policy Study.
W78-03352 6E

WATERLOO UNIV. (ONTARIO). DEPT. OF GEOGRAPHY.
Outlet Drainage - An Assessment of Environmental Effects,
W78-03640 6B

WEST VIRGINIA UNIV., MORGANTOWN. DEPT. OF ECONOMICS.
Ownership and Water System Operation,
W78-03647 6C

WESTON (ROY F.), INC., WEST CHESTER, PA.
Development of Suspended Solids Quality Control and Performance Evaluation Samples,
W78-03450 5A

WILLIAMS AND WORKS, GRAND RAPIDS, MI.
Expansion Program Given 'Go Ahead' in Absence of Federal Funds,
W78-03523 5D

WISCONSIN UNIV.- MADISON. DEPT. OF FORESTRY.
Short- and Long-Term Effects of Antitranspirants on Water Relations and Photosynthesis of Woody Plants,
W78-03642 2I

WISCONSIN UNIV., MADISON. MARINE STUDIES CENTER.
Coastal Upwelling/Downwelling Cycles in Southern Lake Superior,
W78-03239 2H

WISCONSIN UNIV.-PARKSIDE, KENOSHA. DIV. OF SOCIAL SCIENCES.
Economic Feasibility of Irrigating Southern Pines,
W78-03652 3F

WORLD METEOROLOGICAL ORGANIZATION, GENEVA, (SWITZERLAND).
Determination of the Atmospheric Contribution of Petroleum Hydrocarbons to the Oceans,
W78-03285 5B

WYOMING UNIV., LARAMIE. DEPT. OF GEOLOGY; AND WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Cambrian Stratigraphic Nomenclature and Ground-Water prospecting Failures on the Hualapai Plateau, Arizona,
W78-03445 2F

YALE UNIV., NEW HAVEN, CT. YALE LAW SCHOOL.
Balancing of Interest and International Liability for the Pollution of International Watercourses: Customary Principles of Law Revisited,
W78-03368 5G

ZUELLIG A. G., RHEINECK (SWITZERLAND). APPARATEBAU FUER DIE WASSERWIRTSCHAFT.
Venturi Fumes and Requirements for Measurements Techniques for Exact Measurements of Quantities of Waste Water Venturikanaele und messtechnische Anforderungen fuer genaue Abwassermengen),
W78-03569 5A

ZURN INDUSTRIES, INC., ERIE, PA. EVIRO-SYSTEM DIV.
Upflow-Downflow Carbon Adsorption,
W78-03533 5D

ACCESSION NUMBER INDEX

W78-03201 5G
W78-03202 5D
W78-03203 5D
W78-03204 5D
W78-03205 5D
W78-03206 5G
W78-03207 5D
W78-03208 5D
W78-03209 5C
W78-03210 5E
W78-03211 5D
W78-03212 5G
W78-03213 5D
W78-03214 8G
W78-03215 5D
W78-03216 5D
W78-03217 5G
W78-03218 5D
W78-03219 5G
W78-03220 5C
W78-03221 5E
W78-03222 5E
W78-03223 5D
W78-03224 5D
W78-03225 5D
W78-03226 5D
W78-03227 5E
W78-03228 5E
W78-03229 5G
W78-03230 5G
W78-03231 5G
W78-03232 2L
W78-03233 5E
W78-03234 5B
W78-03235 2I
W78-03236 2L
W78-03237 2L
W78-03238 2L
W78-03239 2H
W78-03240 2E
W78-03241 4A
W78-03242 2E
W78-03243 2E
W78-03244 2D
W78-03245 5B
W78-03246 2B
W78-03247 5B
W78-03248 2J
W78-03249 2G
W78-03250 2G
W78-03251 2G
W78-03252 2G
W78-03253 2G
W78-03254 5B
W78-03255 2L
W78-03256 7C
W78-03257 5B
W78-03258 2I
W78-03259 5A
W78-03260 8B
W78-03261 5A
W78-03262 2D
W78-03263 5G
W78-03264 5A
W78-03265 5B
W78-03266 5A
W78-03267 5G
W78-03268 5G
W78-03269 5C
W78-03270 5B
W78-03271 5B
W78-03272 2H
W78-03273 2L
W78-03274 2L
W78-03275 5B
W78-03276 5G
W78-03277 5C
W78-03278 5B
W78-03279 8B
W78-03280 5A
W78-03281 5A
W78-03282 5A
W78-03283 5E
W78-03284 6G
W78-03285 5B
W78-03286 5B
W78-03287 2H
W78-03288 5C
W78-03289 5C
W78-03290 5D
W78-03291 5D
W78-03292 5E
W78-03293 5D
W78-03294 5G
W78-03295 5D
W78-03296 5B
W78-03297 5E
W78-03298 2H
W78-03299 5D
W78-03300 5D
W78-03301 4C
W78-03302 5D
W78-03303 5D
W78-03304 5A
W78-03305 5C
W78-03306 5C
W78-03307 5D
W78-03308 5D
W78-03309 5A
W78-03310 5D
W78-03311 5D
W78-03312 5D
W78-03313 5D
W78-03314 5D
W78-03315 5G
W78-03316 5C
W78-03317 5C
W78-03318 5G
W78-03319 5E
W78-03320 4C
W78-03321 5A
W78-03322 5D
W78-03323 5C
W78-03324 3B
W78-03325 5G
W78-03326 5G
W78-03327 5G
W78-03328 5G
W78-03329 2J
W78-03330 5G
W78-03331 5G
W78-03332 6E
W78-03333 5G
W78-03334 5A
W78-03335 5G
W78-03336 6E
W78-03337 5G
W78-03338 5G
W78-03339 4C
W78-03340 5G
W78-03341 2L
W78-03342 2L
W78-03343 5G
W78-03344 2L
W78-03345 2G
W78-03346 5G
W78-03347 5G
W78-03348 2L
W78-03349 6F
W78-03350 4A
W78-03351 5G
W78-03352 6E
W78-03353 6E
W78-03354 2L
W78-03355 6E
W78-03356 5G
W78-03357 6E
W78-03358 5G
W78-03359 6E
W78-03360 6E
W78-03361 5G
W78-03362 5G
W78-03363 5G
W78-03364 5G
W78-03365 5G
W78-03366 5G
W78-03367 5G
W78-03368 5G
W78-03369 5G
W78-03370 6G
W78-03371 6E
W78-03372 5G
W78-03373 5G
W78-03374 6E
W78-03375 6E
W78-03376 6E
W78-03377 6E
W78-03378 6E
W78-03379 3B
W78-03380 6E
W78-03381 6E
W78-03382 6E
W78-03383 6E
W78-03384 6E
W78-03385 6E
W78-03386 6E
W78-03387 6E
W78-03388 6E
W78-03389 6E
W78-03390 6E
W78-03391 6E
W78-03392 6E
W78-03393 6E
W78-03394 6E
W78-03395 6E
W78-03396 6E
W78-03397 6E
W78-03398 6E
W78-03399 6E
W78-03400 6E
W78-03401 6E
W78-03402 6E
W78-03403 6E
W78-03404 6E
W78-03405 6E
W78-03406 6E
W78-03407 6E
W78-03408 6E
W78-03409 6E
W78-03410 6E
W78-03411 6E
W78-03412 6E
W78-03413 6E
W78-03414 6E
W78-03415 6E
W78-03416 6E
W78-03417 5B
W78-03418 5B
W78-03419 6C
W78-03420 5G
W78-03421 5G
W78-03422 5D
W78-03423 2H
W78-03424 5E
W78-03425 6C
W78-03426 5A
W78-03427 4B
W78-03428 6B
W78-03429 5G
W78-03430 5G
W78-03431 5G
W78-03432 5G
W78-03433 4A
W78-03434 4A
W78-03435 5G
W78-03436 5G
W78-03437 5B
W78-03438 5G
W78-03439 5G
W78-03440 5C
W78-03441 5G
W78-03442 5B
W78-03443 5G
W78-03444 6G
W78-03445 2F
W78-03446 2H
W78-03447 2H
W78-03448 5B
W78-03449 2E
W78-03450 5A
W78-03451 2G
W78-03452 5A
W78-03453 2H
W78-03454 5F
W78-03455 6G
W78-03456 5A
W78-03457 5D
W78-03458 5G
W78-03459 5C
W78-03460 2C
W78-03461 2J
W78-03462 2G
W78-03463 5B
W78-03464 5C
W78-03465 2L
W78-03466 5B
W78-03467 2L
W78-03468 2L
W78-03469 2L
W78-03470 2L
W78-03471 2H
W78-03472 5B
W78-03473 4A
W78-03474 2H
W78-03475 2L
W78-03476 2J
W78-03477 5G
W78-03478 5E
W78-03479 8B
W78-03480 5E
W78-03481 5G
W78-03482 7C
W78-03483 5B
W78-03484 7C
W78-03485 2L
W78-03486 2B
W78-03487 2H
W78-03488 2H
W78-03489 2L
W78-03490 2H
W78-03491 8A
W78-03492 8G
W78-03493 5D
W78-03494 8F
W78-03495 8G
W78-03496 8A
W78-03497 8F
W78-03498 5D
W78-03499 5D
W78-03500 5D
W78-03501 5D
W78-03502 5D
W78-03503 8C
W78-03504 5D
W78-03505 5D
W78-03506 5D
W78-03507 5E
W78-03508 5D
W78-03509 5D
W78-03510 5D
W78-03511 5E
W78-03512 5E

W78-03513	5D	W78-03592	5D	W78-03671	5A
W78-03514	5D	W78-03593	5D	W78-03672	5A
W78-03515	5E	W78-03594	5D	W78-03673	3E
W78-03516	5D	W78-03595	2L	W78-03674	5A
W78-03517	5C	W78-03596	7B	W78-03675	6B
W78-03518	8C	W78-03597	3F	W78-03676	5A
W78-03519	5E	W78-03598	5F	W78-03677	5A
W78-03520	8C	W78-03599	3F	W78-03678	5B
W78-03521	5D	W78-03600	5G	W78-03679	5A
W78-03522	5D	W78-03601	2J	W78-03680	5A
W78-03523	5D	W78-03602	5F	W78-03681	2L
W78-03524	7B	W78-03603	5C	W78-03682	7B
W78-03525	5E	W78-03604	5D	W78-03683	7B
W78-03526	5D	W78-03605	5G	W78-03684	7B
W78-03527	5E	W78-03606	3A	W78-03685	5G
W78-03528	8G	W78-03607	3A	W78-03686	5E
W78-03529	8C	W78-03608	5D	W78-03687	5A
W78-03530	5D	W78-03609	5F	W78-03688	2L
W78-03531	8C	W78-03610	3E	W78-03689	5D
W78-03532	5D	W78-03611	5A	W78-03690	5D
W78-03533	5D	W78-03612	5C	W78-03691	6E
W78-03534	5D	W78-03613	5G	W78-03692	6E
W78-03535	5E	W78-03614	8C	W78-03693	6E
W78-03536	8G	W78-03615	2G	W78-03694	6E
W78-03537	5D	W78-03616	4A	W78-03695	5G
W78-03538	5D	W78-03617	5G	W78-03696	5C
W78-03539	5D	W78-03618	5C	W78-03697	5C
W78-03540	5D	W78-03619	5G	W78-03698	5B
W78-03541	5D	W78-03620	5E	W78-03699	5C
W78-03542	5D	W78-03621	4B	W78-03700	5C
W78-03543	5D	W78-03622	5C		
W78-03544	5D	W78-03623	5G		
W78-03545	5D	W78-03624	8C		
W78-03546	5D	W78-03625	5G		
W78-03547	5D	W78-03626	5G		
W78-03548	5D	W78-03627	5C		
W78-03549	5D	W78-03628	5G		
W78-03550	5E	W78-03629	5D		
W78-03551	8G	W78-03630	4A		
W78-03552	8F	W78-03631	4A		
W78-03553	5E	W78-03632	5G		
W78-03554	5E	W78-03633	4A		
W78-03555	8G	W78-03634	6F		
W78-03556	8F	W78-03635	3F		
W78-03557	5E	W78-03636	5E		
W78-03558	5D	W78-03637	4A		
W78-03559	5B	W78-03638	5G		
W78-03560	5A	W78-03639	5C		
W78-03561	5A	W78-03640	6B		
W78-03562	5A	W78-03641	5B		
W78-03563	5A	W78-03642	2I		
W78-03564	5B	W78-03643	5B		
W78-03565	5D	W78-03644	3F		
W78-03566	5B	W78-03645	6D		
W78-03567	5B	W78-03646	6E		
W78-03568	5D	W78-03647	6C		
W78-03569	5A	W78-03648	5G		
W78-03570	5D	W78-03649	6E		
W78-03571	5A	W78-03650	6E		
W78-03572	5A	W78-03651	6D		
W78-03573	5D	W78-03652	3F		
W78-03574	5A	W78-03653	6G		
W78-03575	5E	W78-03654	2L		
W78-03576	5D	W78-03655	2H		
W78-03577	5A	W78-03656	2L		
W78-03578	5A	W78-03657	5C		
W78-03579	5A	W78-03658	2G		
W78-03580	5B	W78-03659	2L		
W78-03581	5A	W78-03660	6B		
W78-03582	5D	W78-03661	4C		
W78-03583	5C	W78-03662	6B		
W78-03584	8C	W78-03663	5A		
W78-03585	5D	W78-03664	5A		
W78-03586	5D	W78-03665	5A		
W78-03587	5D	W78-03666	5A		
W78-03588	5D	W78-03667	5A		
W78-03589	5D	W78-03668	2H		
W78-03590	5B	W78-03669	5B		
W78-03591	5D	W78-03670	5A		

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
Cornell University, Policy Models for Water Resources Systems	W78-03630--03641 03643--03652	22
ERDA Oak Ridge National Laboratory, Nuclear Radiation and Safety	W78-03696--03698	3
Franklin Institute (FIRL), Municipal and Industrial Wastewater Treatment Technology	W78-03202--03226 03492--03523 03525--03582 03584--03590 03620--03621 03623--03629 03689--03690	133
Illinois State Water Survey, Hydrology	W78-03227--03234 03236--03260 03445--03449 03460--03463 03465--03491 03688	70
Institute of Paper Chem., Water Pollution from Pulp and Paper Industry	W78-03290--03297 03299--03300 03302--03323	32
University of Florida, Eastern U. S. Water Law	W78-03325--03328 03330--03338 03340--03344 03346--03416 03444 03691--03695	95
University of Wisconsin, Eutrophication	W78-03431--03432 03440, 03443 03699--03700	6
STATE WATER RESOURCES RESEARCH INSTITUTES	W78-03201	1

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
C. OTHER		
BioSciences Information Service	W78-03235, 03262 03272, 03287 03298, 03301 03324, 03329 03339, 03345 03451 03453--03454 03464, 03524 03583, 03595 03603 03611--03612 03618, 03622 03642, 03658 03668--03669 03681	27
Information Planning Associates, Inc.	W78-03261 03263--03268 03417--03418 03450, 03452 03455--03459 03663--03667 03670--03680 03682--03687	38
Ocean Engineering Info. Service (Patents)	W78-03591--03594 03596--03602 03604--03610 03613--03617 03619	24
Ocean Engineering Info. Service (Outer Continental Shelf)	W78-03269--03271 03273--03286 03288--03289	19
Office of Water Research and Technology	W78-03419--03428	10
Univ. of Massachusetts (Wetlands)	W78-03653--03657 03659--03662	9

B3474

☆U.S. GOVERNMENT PRINTING OFFICE: 1978-261-081/21

OTAL

27

38

24

19

10

9